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TRANSCRIPT OF RECORD

SUPREME COURT OF THE UNITED STATES

129
OCTOBER TERM, 1928

No. 69

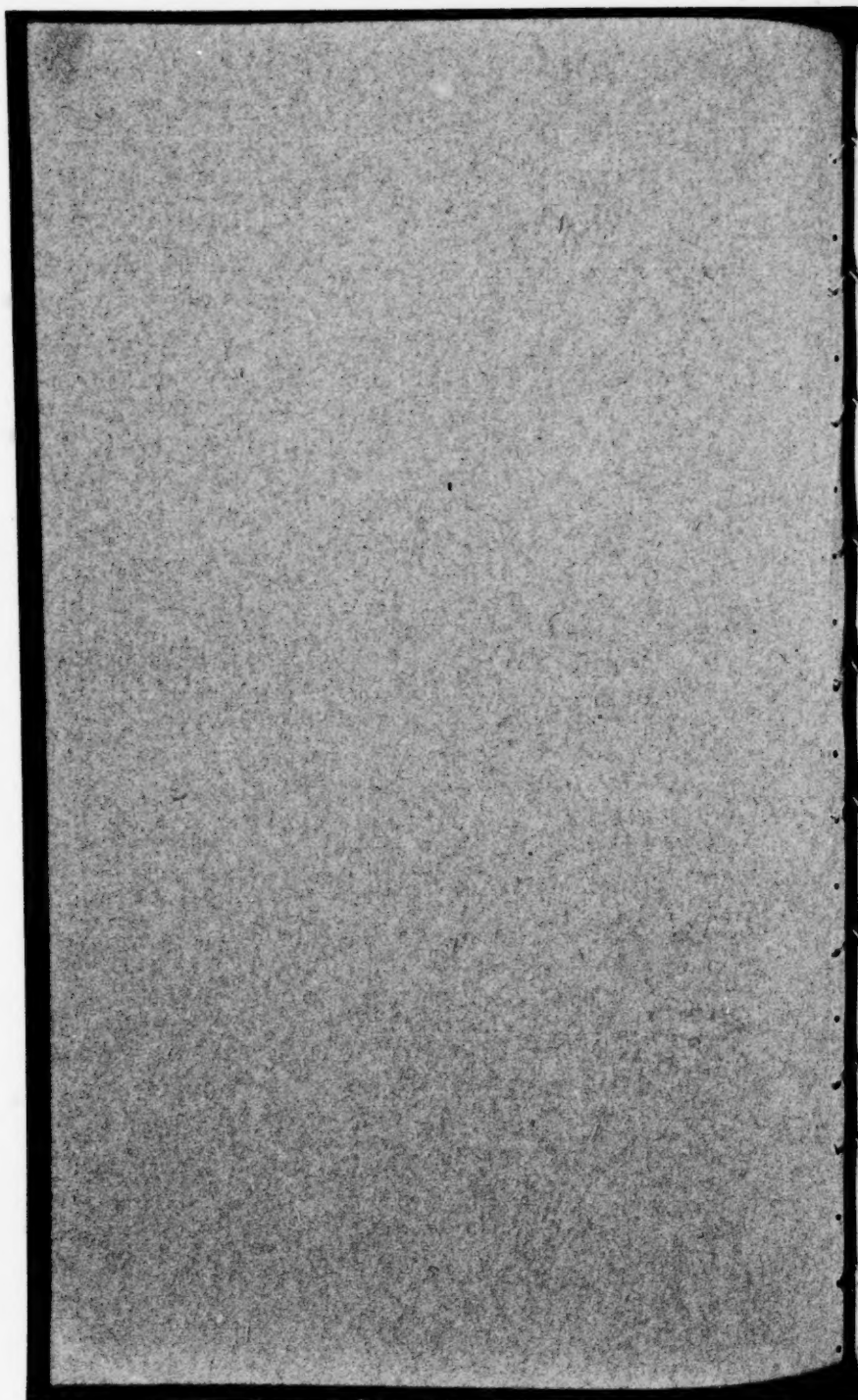
**STATE OF MISSOURI AT THE RELATION TO AND USE OF
WABASH RAILWAY COMPANY AND CHICAGO, ROCK
ISLAND AND PACIFIC RAILWAY COMPANY, PLAINTIFFS IN ERROR,**

**PUBLIC SERVICE COMMISSION OF MISSOURI AND JOHN A.
HURTE, E. J. BEAN, ET AL., ETC., ET AL.**

IN ERROR TO THE SUPREME COURT OF THE STATE OF MISSOURI

FILED APRIL 14, 1929

(31,043)



(31,043)

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM. 1925

No. 366

STATE OF MISSOURI AT THE RELATION TO AND USE OF
WABASH RAILWAY COMPANY AND CHICAGO, ROCK
ISLAND AND PACIFIC RAILWAY COMPANY, PLAIN-
TIFFS IN ERROR,

vs.

PUBLIC SERVICE COMMISSION OF MISSOURI AND JOHN A.
KURTZ, E. J. BEAN, ET AL., ETC., ET AL.

IN ERROR TO THE SUPREME COURT OF THE STATE OF MISSOURI

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[fols. 1 & 2] [Captions omitted]

[fol. 3] **IN CIRCUIT COURT OF COLE COUNTY, MO.**

#4663

STATE OF MISSOURI at the Relation to and Use of THE WARASH
Railway Company and Chicago, Rock Island and Pacific Railroad
Company, Appellants,

vs.

PUBLIC SERVICE COMMISSION OF MISSOURI and JOHN A. KURTZ,
E. J. Bean, Noah W. Simpson, and A. J. O'Reilly, Members of the
said Public Service Commission, and Henry W. Kiel, Mayor City
of St. Louis, Missouri, Respondents.

JUDGMENT—Sept. 1, 1923

Now at this day this cause, which was heretofore argued by counsel for the respective parties and submitted to the Court upon brief for further consideration, comes on for final determination and the Court being now sufficiently advised of and concerning the premises, doth consider and adjudge that the order, judgment and findings of the Public Service Commission of Missouri rendered be reversed, annulled and for naught held and esteemed *and* that the Appellants be restored to all things which they have lost by reason of said judgment.

[fol. 4] It is further considered, ordered and adjudged by the Court that the said cause be remanded to the said Public Service Commission of Missouri for further proceedings to be had herein in conformity with the opinion of this Court herein delivered; and that the said appellants recover against the said respondents their costs and charges herein expended and have execution therefor, to which action of the Court in making said order the Respondents duly excepted and saved their exceptions.

IN CIRCUIT COURT OF COLE COUNTY

[Title omitted]

ORDER GRANTING APPEAL—Sept. 1, 1923

Now at this day comes the Respondents by their attorney and present to the Court their application and affidavit for an appeal, which said application and affidavit are by the Court ordered filed, which is accordingly done, and now said application and affidavit for an appeal are by the Court taken up, examined and found sufficient.

It is, therefore, ordered that appeal herein be and the same is hereby granted said Respondents to the Supreme Court of the State of Missouri.

It is further ordered that Bill of Exceptions shall be filed within the time allowed by law.

[fols. 5-7] Clerk's certificate to foregoing papers omitted in printing.

[fol. 8] JUDGMENT—Omitted; printed side page 3 ante

IN CIRCUIT COURT OF COLE COUNTY

[Title omitted]

ORDER GRANTING APPEAL OF INTERVENERS—Sept. 17, 1923

Now at this day comes on for consideration and hearing the application and affidavit for an appeal of C. H. Rodehaver, Samuel J. Keiffer and West End Grade Crossing Association, a voluntary association of citizens of the City of St. Louis, and it appearing to the Court that within ten days after the judgment was rendered herein each of the above named C. H. Rodehaver, Samuel J. Keiffer and West End Grade Crossing Association, filed their separate affidavits for an appeal and their separate bonds in the sum of five hundred dollars (\$500.00) each, with good and sufficient sureties, each of which said bonds were approved by the clerk.

And it appearing to the Court that the said C. H. Rodehaver and Samuel J. Keiffer and West End Grade Crossing Association were interveners in this case, in a hearing before the Public Service Commission and are, therefore, interested parties herein and it further appearing to the Court that their affidavits and applications for an appeal are in due form and that they are entitled to an appeal herein as interveners.

It is, therefore, ordered by the Court that the said C. H. Rodehaver, Samuel J. Keiffer and West End Grade Crossing Association be and are hereby each granted an appeal herein, as interveners, to the Supreme Court of the State of Missouri.

Leave granted interveners to file Bill of Exceptions within the time required by law.

[fols. 10-12] Clerk's certificate to foregoing paper omitted in printing.

[fol. 13] JUDGMENT—Omitted; printed side page 3 ante

[fol. 14] IX CIRCUIT COURT OF COLE COUNTY

[Title omitted]

ORDER GRANTING APPEAL OF F. H. GERHART—Sept. 1, 1923

Now again on this day comes F. H. Gerhart, a party in interest herein, and files his application and affidavit for an appeal from the judgment and decision of the Court in the above entitled cause, to the Supreme Court of the State of Missouri, which said application and affidavit are by the Court ordered filed, which is accordingly done, and now said application and affidavit are by the Court taken up, examined and found sufficient.

It is, therefore, ordered that an appeal herein be and the same is hereby granted the said F. H. Gerhart to the Supreme Court of the State of Missouri.

It is further ordered that Bill of Exceptions be filed within the time allotted by law.

[fol. 15] IX CIRCUIT COURT OF COLE COUNTY

[Title omitted]

STIPULATION RE BILL OF EXCEPTIONS

Whereas F. H. Gerhart has been allowed an appeal from this Court to the Supreme Court of Missouri in the above entitled cause, and has filed his affidavit and appeal bond as provided by law, as appears from the records of this Court, it is therefore by the parties hereto, through their consent, stipulated and agreed that the bill of exceptions preserved by the Respondents and Intervenors-Respondents herein shall be taken and accepted as and for the bill of exceptions of the said F. H. Gerhart and that the same may be used as such on the appeal taken herein by the said F. H. Gerhart.

(Signed) N. S. Brown, Homer Hall and Luther Burns, Attorneys for the Wabash Railway Company and the Chicago, Rock Island and Pacific Railroad Company, L. H. Breuer and Frank E. Atwood, Attorneys for The Public Service Commission of Missouri, and John A. Kurtz, Edwin J. Bean, Noah W. Simpson and A. J. O'Reilly, members of said Public Service Commission, Geo. F. Hardy and Oliver Senti, Attorneys for Henry W. Kiel, Mayor, and the City of St. Louis, M. C. Early and A. J. Lodge, J. W. Walsh and T. S. Mosby, Attorneys for F. H. Gerhart.

[fol. 16] Clerk's certificate to foregoing papers omitted in printing.

[fol. 17]

IN SUPREME COURT OF MISSOURI

No. 25087

STATE OF MISSOURI ex Rel. WABASH RAILWAY COMPANY et al.,
Respondents,

vs.

C. H. RODEHAVER et al., Appellants

No. 25088

STATE OF MISSOURI ex Rel. WABASH RAILWAY COMPANY et al.,
Respondents,

vs.

F. H. GERHART, Appellant

ORDER CONSOLIDATING CAUSE—Jan. 30, 1924

Now, at this day, the Court having seen and considered the stipulations filed by the said parties that the above-entitled causes be consolidated with State ex rel. Wabash Railway Company et al., Respondents, vs. Public Service Commission et al., Appellants, No. 25,086, and that the abstract of the record to be filed in said cause No. 25,086 be taken as and for the abstract in the above-entitled causes, Nos. 25,087 and 25,088, and that said three causes be briefed, argued, submitted, and decided as one case, it is ordered by the Court that said stipulations be, and are hereby allowed, and that said causes be consolidated for argument.

[fol. 17½]

[File endorsement omitted]

[fol. 18]

IN SUPREME COURT OF MISSOURI

No. 25086

STATE OF MISSOURI at the Relation to and Use of THE WABASH RAILWAY COMPANY and Chicago, Rock Island and Pacific Railroad Company, Respondents,

vs.

PUBLIC SERVICE COMMISSION OF MISSOURI and JOHN A. KURTZ, E. J. Bean, Noah W. Simpson, and A. J. O'Reilly, Members of said Public Service Commission of Missouri, and Henry W. Kiel, Mayor, and the City of St. Louis, Missouri, Appellants

Appellants' Joint Abstract of the Record—Filed March 12, 1924

CAPTION

The Respondents, Wabash Railway Company and Chicago, Rock Island and Pacific Railroad Company, instituted this proceeding in

the Circuit Court of Cole County, Missouri, to review the action of the [fol. 19] Appellant, Public Service Commission of Missouri, in a case pending before and decided by said Commission, entitled, "Henry W. Kiel, Mayor, City of St. Louis, Complainant, vs. Wabash Railway Company (a corporation), Rolla Wells, Receiver of the United Railways Company of St. Louis (a corporation), Chicago, Rock Island and Pacific Railroad Company (a corporation), The Laeclde Gas Light Company (a corporation), Southwestern Bell Telephone Company (a corporation), Union Electric Light and Power Company (a corporation), Cupples Station, Light, Heat and Power Company (a corporation), Kinloch Telephone Company (a corporation), United Railways Company of St. Louis (a corporation), and the City of St. Louis, Defendants," being Case No. 2732 before said Public Service Commission.

Said Public Service Commission decided said cause and entered its findings and order therein on the 9th day of April, 1923.

On the 30th day of April, 1923, and within the time required by law, the Respondents herein filed their motion for a rehearing of said cause which, on the 4th day of May, 1923, was, by order of said Commission duly entered, overruled.

On the 2nd day of June, 1923, and within the time required by law, the Respondents herein filed in the Circuit Court of Cole County, Missouri, their petition for certiorari or review, which said petition (caption and signatures omitted) is as follows:

[fol. 20] "PETITION FOR WRIT OF CERTIORARI

To the Honorable Judge of the Circuit Court of Cole County, Missouri:

The State of Missouri, which sues in this cause at the relation of and to the use of the Wabash Railway Company and Chicago, Rock Island and Pacific Railroad Company, states:

That this application and petition for a writ of certiorari or review in the above mentioned case, No. 2732, before the Public Service Commission of Missouri, is for the purpose of having the reasonableness and lawfulness of the original report, order and decision, and the order and decision on rehearing, of the Public Service Commission of Missouri in said cause inquired into and determined, and the petitioner and relators state to the court that the said Wabash Railway Company is a corporation duly organized and existing under the laws of the state of Indiana and was and is a citizen and resident of that state and a non-resident of the state of Missouri, and was and is engaged as a common carrier and operating a line of railroad into the City of St. Louis in the state of Missouri and between said state and the states of Iowa, Illinois, [fol. 21] Indiana, Ohio and Michigan; that the relator, Chicago, Rock Island and Pacific Railroad Company, is a corporation duly organized and existing under the laws of the state of Illinois and was and is a citizen and resident of that state and a non-resident of the state of Missouri, and that said corporation was and is

engaged as a common carrier and operating a line of railroad into the City of St. Louis in the state of Missouri and between the states of Missouri, Illinois, Iowa, Kansas and other states; that the said Public Service Commission is duly organized under the laws of the state of Missouri and that the individual respondents above named are the duly appointed and acting members of the said Public Service Commission; that the above mentioned case, No. 2732, has heretofore been and is now pending before the Public Service Commission of the State of Missouri and is a proceeding instituted by said complainant, Henry W. Kiel, Mayor of the City of St. Louis, against said defendants in said case No. 2732, for the purpose of obtaining an order of the Public Service Commission requiring the separation of the grades at the crossings of the tracks of said railroad companies and other streets in said [fol. 22] city of St. Louis; that on the 9th day of April, 1923, the Public Service Commission of Missouri, made and filed its report, decision and order in said case and proceeding, ordering and directing the separation of said grades at Delmar Boulevard; that thereafter, and on the 30th day of April, 1923, said railroad companies filed their motion for a rehearing of said report, decision and order in said case and that thereafter, and on the 4th day of May, 1923, said Public Service Commission, by its order made and filed in said cause, overruled the said motion for rehearing and made its said order overruling said motion for rehearing effective on the 14th day of May, 1923.

The petitioner and relators further show to the court that the said report, decision and order of said Public Service Commission made on the 9th day of April, 1923, are unreasonable, unlawful, oppressive, discriminatory and violative of the rights and privileges of the relators under the constitutions and laws of the United States and the State of Missouri, as more particularly appears in the answers filed by the relators as defendants in said case before said Public Service Commission.

[fol. 23] Wherefore, the petitioner and the relators pray the court to issue a writ of certiorari or review directed to the Public Service Commission of the State of Missouri and to the members thereof, directing and commanding it and them to certify and transmit to this court all of the records, pleadings, testimony, exhibits and proceedings made, had and offered in said cause, for the purpose of having the reasonableness and lawfulness of the said report, decision and orders of said Commission inquired into and determined; that said writ will be directed to and served upon said Public Service Commission and the members thereof; that a hearing and investigation be had by this court and the reasonableness and lawfulness of said report, decision and orders of said Commission be inquired into and determined; that said report, decision and orders of said Commission be declared unreasonable, unlawful, unconstitutional and void and that the case be set aside and held for naught; and for all other proper orders and judgment in the premises."

MINUTE ENTRIES

On the 2nd day of June, 1923, and during the March, 1923, adjourned term, the Clerk of the Circuit Court of Cole County, Missouri, issued a writ of certiorari or review to the Public Service [fol. 24] Commission of Missouri, requiring said Commission to certify up the record of said Commission in said cause on or before June 18, 1923; said writ was returned duly served, on the 3rd day of June, 1923, by the Sheriff of said Cole County.

On the 18th day of June, 1923, same being one of the days of the June, 1923, adjourned term of said court, the Public Service Commission of Missouri, appellant herein, filed in the said Circuit Court its return to said writ of certiorari or review issued out of said Court on the 2nd day of June, 1923, as witnesses the following:

Record Entry

"Now, at this day, comes the Public Service Commission of Missouri, and all the members thereof, by their Attorney, L. H. Breuer, and file their return to the writ of certiorari herein, which said return is by the Court ordered filed, which is accordingly done."

The return of the Commission, including transcript of the record, pleadings and exhibits of said Public Service Commission, referred to in said order, is set out in this Abstract of the Record, beginning at page — and for that reason is omitted here.

[fol. 25] On the 21st day of June, 1923, the same being one of the days of the June, 1923, adjourned term of said Circuit Court of Cole County, Missouri, this cause was called for trial before said Court. Henry W. Kiel, Mayor, and the City of St. Louis, appellants herein, intervened by leave of Court as respondents below, and said cause was submitted to the Court upon the record, including the return of the Commission, the transcript of the record, proceedings, testimony and exhibits filed by the Public Service Commission with their return to said writ of certiorari or review, and after due consideration, on the 1st day of September, 1923, being the seventh day of the June, 1923, adjourned term of said Court, the Court rendered and entered the following:

JUDGMENT—Sept. 1, 1923

"Now, at this day, this cause was heretofore argued by counsel for the respective parties and submitted to the Court upon brief for further consideration, comes on for final determination, and the Court being now sufficiently advised of and concerning the premises, does consider and adjudge that the order, judgment and finding of the Public Service Commission of Missouri rendered, be reversed, annulled and for naught held and esteemed, and that the appellants [fol. 26] be restored to all things which they have lost by reason of said judgment.

It is further considered, ordered and adjudged by the Court that the said cause be remanded to the said Public Service Commission of Missouri, for further proceedings to be had herein in conformity with the opinion of this Court herein delivered, and that the said appellants recover against the said respondents, with costs and charges herein expended and for execution therefor, to which action of the Court in making said order, the respondents duly excepted and saved their exceptions. (Opinion filed.)"

OPINION—Filed Sept. 1, 1923

"The Court finds that it is compelled to reverse and remand this case to the Public Service Commission, with instructions to proceed, as speedily as possible, to eliminate the grade crossing in question, in conformity with the views expressed in the dissenting opinion written by Commissioner McIndoe; this Court's view of the case being in accord with the dissenting opinion mentioned.

[fol. 27] This case is well covered in the dissenting opinion; however, the Court desires to call the attention of the Commission to the following points:

1st. That the vertical clearance of the viaduct ordered to be built, by the Commission, is only eighteen (18) feet, which the Court finds to be insufficient and dangerous; in eliminating one danger another should not be created, if possible to avoid.

2nd. Objection is made to the Wabash or elevation plan, by complainants, of having bridge supports or piers in the streets, to support the bridges in the elevation plan; this objection can be overcome by the Commission ordering the bridges to be built without supports or piers in the streets; the Commission should take judicial notice of the fact that this can be done.

3rd. The objection is made to the Wabash or elevation plan that, under said plan, the Wabash would have a "superfine" grade through Forest Park, wholly out of keeping with the balance of the Wabash System; the Court is of the opinion that this is a strong argument in favor of and not an objection to the elevation plan. Especially is this true if we compare the grades in the elevation plan [fol. 28] with the grade provided for in the City plan.

4th. The Wabash or elevation plan would immediately eliminate two dangerous crossings, to-wit: Delmar Boulevard and Hamilton Avenue. The majority opinion states that all grade crossings are dangerous; this is especially true of crossings where the traffic is heavy, as it is on Delmar Boulevard and Hamilton Avenue; therefore, if the two crossings can be eliminated in this proceeding, it should be done, even though the cost would be somewhat in excess of the City plan of eliminating the Delmar crossing alone.

Noting the objections to the Wabash or elevated plan, it is stated in the majority opinion that this plan would forever preclude the elimination of the Wabash grade crossings, south of Delmar Boulevard, by any other method than track elevation; however, if the City

plan is adopted it would preclude any elimination of grade crossings, south of Delmar Boulevard, except by depressing the tracks of the Wabash, so that if either plan is accepted, future separation of the grade crossings must be made in accordance with whatever plan is adopted at Delmar Boulevard.

[fol. 29] The objection as to the supports of the bridges or piers has already been noted; it is also urged that the Wabash plan should not be adopted for the reason that it would perpetuate the sump at the Hamilton Avenue crossing; the Court is of the opinion that the Wabash is not under obligations to eliminate this sump and that that should be taken care of in some other way; that a thorough drainage system can be provided for under the Wabash or elevated plan is beyond question.

In taking the objections as a whole and analyzing them, we must come to the conclusion that the only material objection to the Wabash or elevation plan is that it would obstruct the view and mar the beauty of Forest Park; there is some difference of opinion on this point, but, taking that to be true, the advantages under the Wabash or elevation plan, far exceed those of the City plan, as now shown by the record in this case.

As to the power of the Public Service Commission in ordering the separation of the grades, to apportion the costs and to prescribe the method and plan by which it is to be done, both the majority and minority opinion are in harmony and the Court is of the opinion that the Commission has the powers, as expressed in said opinion."

[fol. 30] To which action and ruling of the Court in rendering and entering said judgment and in filing said opinion, the Public Service Commission of Missouri, Henry W. Kiel, Mayor, and the City of St. Louis, appellants herein, duly excepted at the time and saved their exceptions.

MINUTE ENTRY OF FILING MOTION FOR NEW TRIAL

Thereafter, on the same day, to-wit, Saturday, September 1, 1923, the same being one of the days of the June, 1923, adjourned term of said Circuit Court, and within four days after the finding, judgment and decision of said Court, the Public Service Commission of Missouri, Henry W. Kiel, Mayor, and the City of St. Louis, appellants herein, filed their motion for a new trial in said cause, which is hereinafter set out in this Abstract of the Record, for which reason here omitted.

MINUTE ENTRY OF ORDER OVERRULING MOTION FOR NEW TRIAL

The Court, upon the same day as the filing of said motion, to-wit, on the 1st day of September, 1923, and during the June, 1923, adjourned term, duly considered said motion for a new trial and by its order, duly entered of record, overruled the same, to which action

of the Court in overruling said motion, the appellants on whose behalf said motion was filed, duly excepted and saved their exceptions.

MINUTE ENTRY OF FILING AND OVERRULING OF MOTION IN ARREST OF JUDGMENT

On the same day, to-wit, September 1, 1923, and during the June, 1923, adjourned term of said Court, and within four days after the finding, judgment and decision of said Court and the overruling [fol. 31] of appellants' motion for a new trial, the Public Service Commission of Missouri, Henry W. Kiel, Mayor, and the City of St. Louis, appellants herein, filed in this cause their motion in arrest of judgment rendered in said cause, which said motion is hereinafter set out in this Abstract of the Record, for which reason here omitted.

Said motion then and there and on said date was by the Court taken up and overruled, to which action of the Court in overruling said motion, appellants then and there duly excepted and saved their exceptions.

MINUTE ENTRIES OF ORDERS ALLOWING APPEALS

On the same day, to-wit, September 1, 1923, and during the June, 1923, adjourned term of said Court, and within four days after the finding, judgment and decision of said Court in said cause and the overruling of appellants' motions for a new trial and in arrest of judgment, the Public Service Commission of Missouri, appellant herein, filed in this cause its application and affidavit for an appeal to the Supreme Court of Missouri and was duly allowed an appeal to said Court and granted time to file its bill of exceptions within the time required by law. Said affidavit for appeal is hereinafter set out in this Abstract of the Record.

On the same day, to-wit, September 1, 1923, and during the June, 1923, adjourned term of said Court, being the same term in which the motion for a new trial was overruled, Henry W. Kiel, Mayor, [fol. 32] and the City of St. Louis, appellants herein, filed in said cause their application and affidavit for appeal to the Supreme Court of Missouri, and duly filed a cost bond, payable to the State of Missouri, in the sum of Five Hundred (\$500.00) Dollars, which was duly approved by the Court, and said appellants were allowed an appeal as prayed for and were granted time to file their bill of exceptions within the time required by law, which said application for appeal is hereinafter set out in this Abstract of the Record.

Thereafter, on the 25th day of September, 1923, and during the June, 1923, adjourned term of said Court and within the time required by law, the appellants presented to the Circuit Court of Cole County, Missouri, their joint bill of exceptions which was by the

Court duly approved, allowed, signed, sealed, filed, and made a part of the record in said cause as appears by the following:

Bill of Exceptions—Filed Sept. 25, 1923

CAPTION

"Now, this day, come the Respondents herein, by their Attorneys, and present to the Court their Bill of Exceptions herein and pray that the same may be approved, signed and sealed by the Judge, filed with the Clerk of this Court and entered as a part of the record in this cause, all of which is accordingly done."

[fol. 33] And the Bill of Exceptions so filed herein, including transcript of the record, proceedings, entries and exhibits of the Public Service Commission of Missouri, in Case No. 2732, heard by said Commission, is as follows:

Be it remembered that on Saturday, July 21, 1923, the same being one of the days of the June, 1923, term of the Cole County Circuit Court, begun and holden in the City of Jefferson, Missouri, the above entitled cause came on to be heard on the issue heretofore joined therein before the Honorable Henry J. Westhues, Judge of said Circuit Court.

Whereupon the following proceedings were had, to-wit:

APPEARANCES OF COUNSEL

N. S. Brown, Homer Hall, for Relators.

L. H. Breuer, General Counsel, for Respondent, Missouri Public Service Commission.

Oliver Senti, 1st Associate, City Counselor, for Henry W. Kiel, Mayor of the City of St. Louis, and the City of St. Louis, as Intervening Respondents.

[fol. 34]

OFFERS IN EVIDENCE

The Relators, to maintain the issue on their behalf to be maintained, offered and introduced in evidence their petition for certiorari or review, the writ of certiorari issued on said petition, the return of the Sheriff on said writ, the return of the Public Service Commission to said writ, the original pleadings, the transcript of the record and testimony, exhibits, record entries, findings, report, order and dissenting opinion, certified to by the Public Service Commission of Missouri, and filed in the Circuit Court of Cole County by said Commission, with its return to said writ of certiorari, the same being as follows:

[fol. 35]

RETURN TO WRIT OF REVIEW

"Comes now the Respondent, Public Service Commission of Missouri, and in obedience to the Writ of Review issued out of the

Circuit Court of Cole County, Missouri, in the above entitled cause and for its return thereto, herewith transmits to the Honorable Circuit Court of Cole County, Missouri, a full, true and complete transcript of the record of all the proceedings and testimony had and taken, together with all the original exhibits introduced in evidence in the proceedings had before said Commission, entitled "Henry W. Kiel, Mayor of the City of St. Louis, vs. Wabash Railway Company, et al.," being Case No. 2732, as full as the same appear on file and of record in the office of said Commission.

Done at Jefferson City, Missouri, this 18th day of June, 1923.

STATE OF MISSOURI,

County of Cole, ss:

I, J. P. Painter, as Secretary of the Public Service Commission of the State of Missouri, do hereby certify that the above and foregoing is a full, true and correct transcript of all the testimony, pleadings, records and proceedings before the Public Service Commission [1068, 36 & 37] of Missouri, in the case before said Commission, entitled "Henry W. Kiel, Mayor of the City of St. Louis, vs. Wabash Railway Company et al.," as full as the same appears on file and of record in the office of said Commission, and that the Exhibits returned herewith as part of this transcript are all of the exhibits as offered in evidence in said case.

In testimony whereof I have hereunto set my hand and affixed the seal of said Commission at office in Jefferson City, Cole County, Missouri, this 18th day of June, 1923.

J. P. Painter, Secretary."

[fol. 38]

Complainant's Abstract of Record

BEFORE THE PUBLIC SERVICE COMMISSION OF MISSOURI

Case No. 2732

HENRY W. KIEL, Mayor of the City of St. Louis, Complainant,

vs.

WABASH RAILWAY COMPANY et al., Defendants

CAPTION

Complaint in this case was filed by Henry K. Kiel, Mayor of the City of St. Louis on the 8th day of October, 1920, against the Wabash Railway Company and Rolla Wells, receiver of the United Railways Company of St. Louis. Subsequently an amended complaint was filed by leave, making the Chicago, Rock Island and Pacific Railroad Company, The Laeclde Gas Light Company, the Southwestern Bell Telephone Company, the Kinloch Telephone Company, the Union Electric Light and Power Company, Cupples Station Light,

[fol. 39] Heat and Power Company and the United Railways Company of St. Louis parties defendant, and due service upon said parties was had.

Said amended complaint is in words and figures, as follows:

AMENDED BILL OF COMPLAINT

BEFORE THE PUBLIC SERVICE COMMISSION OF THE STATE OF
MISSOURI

Case No. 2732

HENRY W. KIEL, Mayor of the City of St. Louis, Complainant,

vs.

WABASH RAILWAY COMPANY (a Corporation), ROLLA WELLS, Receiver of the United Railways Company of St. Louis (a Corporation), Chicago, Rock Island & Pacific Railroad Company (a Corporation), The Laclede Gas Light Company (a Corporation), Southwestern Bell Telephone Company (a Corporation), Kinloch Telephone Company (a Corporation), Union Electric Light and Power Company (a Corporation), Cupples Station Light, Heat and Power Company (a Corporation), The City of St. Louis (a municipal corporation), The United Railways Company of St. Louis (a Corporation), Defendants.

The complainant, Henry W. Kiel, respectfully shows:

[fol. 40]

I

That the complainant is the Mayor of the City of St. Louis, Missouri, and that his post office address is Room 200, City Hall, St. Louis, Missouri.

II

That the Wabash Railway Company is a corporation, engaged as a common carrier, owning and operating a line of steam railroads in and through the City of St. Louis and State of Missouri, existing under and by virtue of the laws of the State of Missouri; that the United Railways Company of St. Louis is a corporation, organized and existing under and by virtue of the laws of the State of Missouri, and as such is the owner of a system of street railways now operated by Rolla Wells, receiver of said property, over and above Delmar boulevard at the point herein described; that The Laclede Gas Light Company is a corporation organized and existing under the laws of the State of Missouri, and owns and operates a public utility, being engaged in the manufacture and distribution of gas for fuel and lighting, and as such under a franchise has laid, and is now using, piped for distribution of gas on Delmar boule-

vard at the point herein described, and at certain intersecting streets affected by said proposed change of grade; that the Chicago, Rock Island & Pacific Railroad Company is a corporation engaged as a common carrier and operating a line of steam railroads in and through the City of St. Louis, State of Missouri, under and by authority of the laws of the State of Missouri; that the tracks of the Chicago, Rock Island & Pacific Railroad Company connect with [fol. 41] the tracks of the Wabash Railway Company at a point near Union boulevard with Lindell boulevard in the City of St. Louis; that said connection is at grade, and that the plan and method of separation of grades at Delmar boulevard of the tracks aforesaid will in the very nature of things affect the method and manner of any change of grade that may hereafter be ordered or made of the tracks of the Chicago, Rock Island & Pacific Railroad Company, for which reason said Chicago, Rock Island & Pacific Railroad Company is made a party defendant herein; that the Southwestern Bell Telephone Company is a corporation operating by virtue of the laws of the State of Missouri, and as such owns and controls a public utility, being engaged in operating telephone service within the City of St. Louis and as such, under a franchise, has placed poles, wires and conduits upon, over and within Delmar boulevard at the point above described and at certain intersecting streets affected by said proposed change of grade; that the Kinloch Telephone Company is a corporation operating by virtue of the laws of the State of Missouri, and as such owns and controls a public utility, being engaged in operating telephone service within the City of St. Louis and as such, under a franchise, has placed poles, wires and conduits upon, over and within Delmar boulevard at the point herein described, and at certain intersecting streets affected by said proposed change of grade; that the Union Electric Light and Power Company is a corporation operating under the laws of Missouri, and as such engaged in the business of manufacture and distribution of electricity for light, heat and power, and as such, under a franchise, has placed poles, wires conduits upon, over and [fol. 42] within Delmar boulevard at the point above described and at certain intersecting streets affected by said proposed change of grade; that the Cupples Station Light, Heat and Power Company is a corporation organized and existing under the laws of Missouri and as such owns and operates a public utility, being engaged in furnishing and distributing electricity for light, heat and power and as such, under a franchise, has placed poles and wires and over Delmar boulevard at the point herein described and at certain intersecting streets affected by said proposed change of grade; that all the above public service corporations and the receiver aforesaid are affected by the separation of the grades as set out in the complaint herein, and that the address and main office of each of the above defendants is at St. Louis, Missouri.

III

Complainant states that the tracks of the Wabash Railway Company cross Delmar boulevard at grade; that the tracks and rails of

the said Wabash Railway Company are laid at grade where same intersects Delmar boulevard; that such tracks are continually used by said company for the passage of trains, both freight and passenger, over and across Delmar boulevard; that Delmar boulevard is an open, public and much traveled thoroughfare in the City of St. Louis; that the United Railways Company of St. Louis, through its receiver, Rolla Wells, maintains and operates street cars for the carriage of passengers for hire over and along Delmar boulevard at grade, the tracks of which at said point intersect and cross the [fol. 43] tracks of the Wabash Railways Company at grade; that the use of the thoroughfare by pedestrians and vehicles, and the use of the tracks of the Wabash Railway Company for trains, and the use of the tracks of the United Railways Company of St. Louis by its receiver for street cars, all on the same grade, render this crossing unsafe and dangerous to travel along said highway and that a separation of said grades is practicable.

Wherefore, the complainant prays that the aforesaid Wabash Railway Company, Rolla Wells, receiver of the United Railways Company of St. Louis, The United Railways Company of St. Louis, a corporation, Chicago, Rock Island & Pacific Railroad Company, The Laeclde Gas Light Company, Southwestern Bell Telephone Company, Kinloch Telephone Company, Union Electric Light and Power Company, Cupples Station Light, Heat and Power Company, and the City of St. Louis, be required to answer the charges herein, and that after due hearing and investigation an order be made by the Public Service Commission of Missouri commanding the Wabash Railway Company to separate the grades aforesaid by the construction of a substantial viaduct over their tracks for the travel of vehicles, pedestrians and street cars over Delmar boulevard; that the defendants, United Railways Company of St. Louis and Rolla Wells, receiver, be required and commanded to separate said grades by elevating the street railway tracks to and upon the grade of the roadway of the viaduct so to be erected over and above the tracks of the Wabash Railways Company; that the defendants, The Laeclde [fol. 44] Gas Light Company, Southwestern Bell Telephone Company, Kinloch Telephone Company, Union Electric Light and Power Company, and Cupples Station Light, Heat and Power Company, be required and commanded to adjust their poles, wires, pipes, conduits or other appliances to the elevation to which Delmar boulevard and intersecting streets will be raised by reason of the construction of said viaduct; that the Commission prescribe the terms upon which such separation shall be made, and the proportion in which the expense of the alteration and abolition of such grade crossings shall be divided between the parties affected thereby, and that the Commission make such other and further orders as it may deem right and proper.

— — — — —, Complainant, by — — — — —, His Attorney.

Dated at the City of St. Louis, Missouri, this 23rd day of February, 1921.

The defendant, Wabash Railway Company, filed its separate answer to said amended complaint which (omitting caption and signatures) is in words and figures as follows:

[fol. 45] ANSWER OF WABASH RAILWAY COMPANY TO AMENDED COMPLAINT

Comes now Wabash Railway Company, one of the defendants in the above-entitled cause, and for its separate answer to the amended complaint herein, says:

I

This defendant admits the averments of paragraph I of the amended complaint.

II

This defendant admits the following averments of paragraph II of the complaint, to wit: Admits that this defendant is a corporation engaged as a common carrier owning and operating a line of steam railroad in and through the City of St. Louis and State of Missouri, but denies that it is a corporation existing under and by virtue of the laws of the State of Missouri; admits that the tracks of the Chicago, Rock Island & Pacific Railway Company connect with the tracks of this defendant in the City of St. Louis, and admits that the connection between said tracks is at a point near Union boulevard and Lindell boulevard; admits that the connection between the tracks of said railroad is at grade and that the plan and method of separation of grades at Delmar boulevard of the tracks of this defendant will in the very nature of things affect the method and manner of any change of grade that may hereafter be ordered made of the tracks of the Chicago, Rock Island & Pacific Railway Company; and admits that this defendant and said Chicago, Rock Island [fol. 46] & Pacific Railway Company would be affected by separation of the grades as set forth in the amended complaint herein. For further answer to paragraph II of the amended complaint, this defendant states that it denies each and every other allegation contained therein.

III

This defendant admits that the tracks of this defendant cross Delmar boulevard at grade; admits that the tracks and rails of this defendant are laid at grade where the same intersect Delmar boulevard, and while admitting that such tracks are used by this defendant for the passage of certain of its freight and passenger trains, defendant denies that such tracks are continually so used; admits that Delmar boulevard is an open, public and much traveled thoroughfare in the City of St. Louis; admits, on information and belief, that the United Railways Company of St. Louis, through its receiver, Rolla Wells, maintains and operates street cars for the carriage of passengers for hire, along and over Delmar boulevard at grade, the tracks of which at said point intersect and

cross the tracks of this defendant at grade, but this defendant denies that the use of the thoroughfare by pedestrians and vehicles, and the use of the tracks by this defendant for its trains, and the use of the tracks of the United Railways Company for its street cars, all on the same grade, renders said crossing unsafe or dangerous to travel along said highway and further denies that a separation of said grade is practicable, and specifically denies that it is practicable [fol. 47] to separate said grades by the construction of a viaduct on said Delmar boulevard, and over the tracks of this defendant, for the travel of pedestrians and vehicles using Delmar boulevard.

IV

Further answering, this defendant says that the amended petition of the complainant, as Mayor of the City of St. Louis, to separate the grades of Delmar avenue and the right of way and tracks of this defendant at their point of crossing by means of the proposed viaduct over said railroad right of way and tracks at said point, and to carry Delmar avenue over said tracks upon said viaduct is but a single part of one general plan heretofore prepared by said City for the separation of the grades of all of the streets and drives which cross the right of way and tracks of this defendant between the east line of Forest Park in said city and the northern city limits of said city, a distance of approximately three miles, and said plans of said City constitute a complete and indivisible plan for the separation of the grade crossings here referred to and which the City proposes and has threatened from time to time to impose upon this defendant. That said complete plan of the City contemplates, among other things (1) that the present grades of defendant's tracks at the point where they cross Delmar avenue shall remain as they now are and that a viaduct shall be constructed over said tracks for the purpose of carrying Delmar avenue upon said viaduct and over said tracks at said point of crossing; (2) that from Delmar avenue northwardly to the city limits the present roadbed of this defendant shall be [fol. 48] elevated upon an earthen embankment to a height of approximately fifteen feet above the present grade of the roadbed and that the railroad tracks shall be carried over the intersecting public streets and highways by means of bridges constructed in such streets or highways; (3) that south of Delmar avenue, between said avenue and the point where said railroad intersects the east line of Forest Park, the present grade of defendant's railroad is to be depressed by excavation into a ditch of varying depths reaching at some points a maximum point of twenty-five (25) feet below the present grade of defendant's roadbed and extending said ditch or excavation into and through Forest Park in said city, and that within said limits the intersecting streets and drives are to be carried over the tracks of this defendant by means of overhead bridges; (4) that from the point where defendant's railroad intersects the east line of Forest Park to the point where defendant's railroad intersects the north line of Forest Park and Lindell avenue, said plan

proposes unlawfully and forcibly to take from this defendant and deprive it of its right of way without compensation therefor, and to move its tracks and roadbed therefrom; (5) that from the point where defendant's railroad intersects the north line of Forest Park and the south line of Lindell avenue to a point on defendant's right of way north of Lindell avenue and west of Union avenue said plan would unlawfully and wrongfully force and compel this defendant to vacate and abandon its present right of way without compensation therefor and would unlawfully and wrongfully require and compel this defendant to acquire another and different right of way for the operation of its railroad.

[fol. 49] And defendant further says that the matter of separating the grade crossings of defendant's right of way and tracks and the intersecting streets and drives between the east line of Forest Park and the northern city limits has been the subject of controversy between this defendant and the City for the past several years and the City has at all times claimed and insisted that the only plan or scheme for the separation of the grades of the intersecting streets, between Delmar avenue on the north and the east line of Forest Park on the south, that would be accepted or proposed by said City is the plan above described, requiring the depression or excavation of defendant's roadbed in the manner shown by the City's plans therefor and heretofore generally described; whereas, on the other hand, this defendant has insisted and now insists that the proposed plan of said City to require this defendant to depress its roadbed and tracks between Delmar avenue on the north and the east line of Forest Park on the south, and to vacate and abandon a part of its roadbed and right of way, as aforesaid, will wholly destroy that part of defendant's railroad, and constitutes a confiscation thereof.

This defendant further states that the proposed plan of said City to require this defendant to depress its roadbed and tracks south of Delmar avenue would wholly destroy that part of defendant's railroad and constitute a confiscation thereof, because of the exceptional physical conditions under which said work would have to be done and the conditions under which that part of defendant's railroad would have to be thereafter operated and maintained.

[fol. 50] Defendant further says that any order of this Commission which requires this defendant to construct or which permits the City of St. Louis to construct a viaduct upon Delmar avenue and over the right of way and tracks of this defendant as proposed in the petition herein will irrevocably fix and determine that all subsequent separation of the grade crossings aforesaid, between Delmar avenue on the north and the east line of Forest Park on the south, shall be accomplished by the depression of defendant's roadbed and tracks substantially as provided for by the present plans of the said City as above described and will forever conclude this defendant from thereafter asserting its right and claim to accomplish the separation of such grade crossings, if and when the same shall lawfully be required, by means of elevating defendant's roadbed and tracks to such height and in such manner as this Commission may hereafter require or approve.

And defendant says that the complainant herein as the Mayor and representative of the City of St. Louis well know that, once a viaduct is constructed upon Delmar avenue and over and across defendant's right of way and tracks as proposed in this proceeding, this defendant will thereby forever thereafter be concluded from asserting any right or claim or any possibility of thereafter separating the grades of intersecting streets and drives between Delmar avenue on the north and the east line of Forest Park on the south by means of the so-called elevation plan, and that one of the chief purposes of the complaint in this cause is to secure an order from this Commission requiring this defendant to construct or permit [fol. 51] the City of St. Louis to construct the proposed viaduct on Delmar avenue and thereby to forever conclude both this defendant and the City of St. Louis from thereafter claiming any right to elevate the roadbed and tracks of this defendant between Delmar avenue on the north and the east line of Forest Park on the south, for the purpose of accomplishing such separation of intersecting grade crossings as may be hereafter lawfully required from time to time.

And defendant says that forasmuch as the proposed viaduct is but a single item of a complete and comprehensive plan of the City of St. Louis for the separation of the grades of all streets, highways and drives intersecting the right of way and tracks of this defendant between the east line of Forest Park and the northern city limits of said City that this Commission should in equity and good conscience inquire into and determine the lawfulness, reasonableness, and practicability of the entire plan of said City as well as the reasonable necessity for any separation of grades of Delmar avenue, or of any other streets or highways or drives and the right of way of this defendant within the boundaries covered by the said plans of said City.

And defendant further says that any order of this Commission requiring the separation of the grade crossing at Delmar avenue by means of a viaduct as proposed in the petition herein will by its necessary effect require this defendant presently or in the future to depress its roadbed and tracks between Delmar avenue on the north and the east line of Forest Park on the south, and to abandon its [fol. 52] present right of way as aforesaid, and will thereby result in entirely destroying that part of the railroad of this defendant between said boundaries and constitute a denial of this defendant's right to use its right of way and railroad between said boundaries, and a confiscation thereof without due process of law, contrary to Article II, Section 30 of the Constitution of the State of Missouri, and Article XIV, Section 1 of the Amendments to the Constitution of the United States, and will unlawfully restrict and prevent the future exercise of the powers of this Commission or its successor to determine, after a hearing, the time when and mode or manner whereby, such separation of said grade crossings shall be accomplished.

V

Further answering, this defendant says that it has heretofore acquired its present right of way through Forest Park, now in the City of St. Louis, by purchase, transfer and assignment to it by its predecessor in title and interest, the St. Louis County Railroad Company; that said right of way was acquired by the said St. Louis County Railroad Company and is now held by this defendant under and by virtue of an Act of the General Assembly of the State of Missouri, approved March 25, 1874, entitled, "An Act to establish Forest Park" (Laws Missouri, 1874, p. 371). That said Act, among other things, provides that the grade of said railroad so far as the same runs through Forest Park shall be approved by the Park Commissioners appointed and acting by virtue of the authority conferred by said Act. That thereafter and before the railroad of this [fol. 53] defendant was constructed upon the said right of way through Forest Park the predecessors of this Company and the said Park Commissioners entered into a valid and binding agreement in writing fixing the location of said right of way and providing that this defendant's predecessors and its successors and assigns should have and enjoy all of the rights, privileges, immunities, franchises, improvements, and property set forth in said agreement continuously and forever, and that no material alteration or change should be permitted in said tracks without the consent of all the contracting parties thereto and said railroad was thereafter constructed upon said right of way through said park upon the grade approved by said Park Commissioners and agreed upon by the parties to said agreement and has ever since been operated and maintained on said right of way and at said grade, and neither this defendant nor its predecessor has ever consented to the material alteration and change proposed and required by the said plan of the City.

And defendant says that the said right of way through said Forest Park was acquired by defendant's predecessor, the St. Louis County Railroad Company, and by the grantors of this defendant for a valuable consideration and the aforesaid Act of the General Assembly of the State of Missouri and the agreement between the predecessors of this defendant and Forest Park Commissioners as aforesaid constitute valid and binding contracts between the State of Missouri and this defendant and are valid and binding upon the City of St. Louis. And defendant says that any order of this Commission requiring this defendant to change the present right of [fol. 54] way or the present grade of its railroad, or any part thereof, as the same is now constructed and operated upon its said right of way through Forest Park will constitute a violation of the said contract rights of this defendant and impair the obligations of the contracts between the State of Missouri and this defendant and between the Commissioners of Forest Park and this defendant contrary to the provisions of Section 10 of Article I of the Constitution of the United States, and this defendant would thereby be deprived of valuable and lawful rights and privileges and its property would

be thereby taken and damaged for public use without just compensation, in violation of Article II, Section 21 of the Constitution of the State of Missouri, and it would be deprived of its property without due process of law in violation of Article II, Section 30 of the Constitution of the State of Missouri, and would be denied the right of trial by a jury on its claim for compensation for its property so taken and damaged contrary to Article XII, Section 4 of the Constitution of the State of Missouri, and would be deprived of its property without due process of law and its property would be taken for public use without due compensation contrary to Article V of the Amendments to the Constitution of the United States, and it would be deprived of its property without due process of law and would be denied the equal protection of the laws contrary to Article XIV, Section 1 of the Amendments to the Constitution of the United States.

VI

Further answering, this defendant says that under the provisions [fol. 55] of said Act of the General Assembly of the State of Missouri, approved March 25, 1874, said Park Commissioners entered into a tripartite agreement, dated August 11, 1875, with said St. Louis County Railroad Company and the St. Louis, Kansas City & Northern Railway Company, the grantors and predecessors in title and interest of this defendant, by which it was agreed and provided that said St. Louis County Railroad Company should permit under such reasonable regulations and terms as might be agreed upon, other railroads to use its right of way through Forest Park and up to the terminus of its road at Union Station in the City of St. Louis, upon such terms and for such fair and equitable compensation to be paid to it therefor as might be agreed upon by such companies; that the St. Louis, Kansas City & Colorado Railroad Company, which was the grantor and predecessor in title and interest of the defendant Chicago, Rock Island & Pacific Railway Company, under and by virtue of said tripartite agreement and a decree of the Circuit Court of the United States for the Eastern District of Missouri entered on December 13, 1886, was granted the right to use the right of way and tracks, side tracks, switches, turn-outs, turn-tables, and other terminal facilities of this defendant and its predecessors in title between the north line of Forest Park and Eighteenth street in the City of St. Louis at twenty-five hundred dollars (\$2,500.00) per month; and said decree further provided that the expense per annum of maintaining the said right of way and other property pending such joint use thereof, including all taxes upon said property should be borne by the said Wabash, St. Louis & Pacific Railway [fol. 56] Company, the predecessor and grantor of this defendant, and the said St. Louis, Kansas City & Colorado Railroad Company in the proportion that the number of wheels each of said companies shall cause to be passed over the main tracks, or parts thereof, on said right of way, per annum, bears to the total number of wheels that both of said companies shall cause to be passed over the same during each year pending the said period of such joint use, and that

this expense shall be paid at the expiration of each year, that the said right of way and tracks thereon and other terminal facilities shall be maintained and kept in good repair by the Wabash, St. Louis & Pacific Railway Company. And the said decree further provided that said St. Louis, Kansas City & Colorado Railroad Company shall enjoy the equal use and benefit of said right of way, tracks, switches, sidetracks, turn-outs, turn-tables, and other terminal facilities with said Wabash, St. Louis & Pacific Railway Company or its said receivers, and the said Wabash, St. Louis & Pacific Railway Company and all persons claiming by, through, or under it, and their agents, servants, counsels, and employes were perpetually enjoined and restrained from in any manner refusing to permit the said intervenor, the said St. Louis, Kansas City & Colorado Railroad Company, its successors or assigns, from using with its or their engines and cars the said rights of way, tracks, switches, sidetracks, turn-outs, turn-tables, and other terminal facilities of said Wabash, St. Louis & Pacific Railway Company between the north line of Forest Park and said Eighteenth street, on the terms therein above set forth in said decree, in and for the transaction of its or their [fol. 57] business and in the operation of its or their road. Said decree further provided that the said St. Louis, Kansas City & Colorado Railroad Company should have the right to make connection with this defendant's said predecessor at the north line of Forest Park and to use the said right of way, tracks, switches, sidetracks, turn-outs, turntables, and other terminal facilities of said Wabash, St. Louis & Pacific Railway Company, or anyone claiming by, through or under it, as to the same, between the north line of said park and said Eighteenth street, on the terms, in the manner and subject to the regulations in said decree set forth in and for the transaction of the business and in operation of the road of said St. Louis, Kansas City & Colorado Railroad Company, its successors or assigns; that after the entering of said decree, said St. Louis, Kansas City & Colorado Railroad Company, the predecessor and grantor of defendant Chicago, Rock Island & Pacific Railway Company, entered into the use of this defendant's right of way, tracks, and facilities from the north line of Forest Park to Eighteenth street in the City of St. Louis as provided in and under the terms of said decree and has ever since and now is using this defendant's said right of way, tracks, and facilities and is paying this defendant for such use as provided in said decree; that said compensation so paid to this defendant is a valuable right which this defendant is entitled to receive and enjoy under the terms and provisions of said tripartite agreement and said decree of court. This defendant further states that the said plan of the City of St. Louis for the separation of grades at Delmar boulevard will necessitate and require that at the [fol. 58] point where the tracks of this defendant connect with the tracks of the defendant Chicago, Rock Island & Pacific Railway Company, the said company's tracks shall be sunk or depressed into a ditch approximately twenty-five (25) feet below the present level of said connection and with necessitate and require that said Chicago, Rock Island & Pacific Railway Company shall sink or depress its

tracks west of the point of said connection; that a short distance west of said connection the tracks of the said Chicago, Rock Island & Pacific Railway Company cross over the River Des Peres, that it would be impossible for said Chicago, Rock Island & Pacific Railway Company to operate its railroad over said River Des Peres, and through the ditch or excavation and at the grade provided and required by the plan of said City and that as a result thereof said Chicago, Rock Island & Pacific Railway Company would be compelled to abandon, or greatly decrease the operation of its trains over its said track and upon the right of way of this defendant as it now does, and this defendant would thereby be deprived of valuable rights, privileges, and compensation which it now receives for such use of its right of way and tracks and its property would be thereby taken and damaged for public use without just compensation, in violation of Article II, Section 21 of the Constitution of the State of Missouri, and it would be deprived of its property without due process of law in violation of Article II, Section 30 of the Constitution of the State of Missouri, and would be denied the right of trial by a jury on its claim for compensation for its property so taken and damaged contrary to Article XII, Section 4 of the Constitution of the State of Missouri, and would be deprived of its property without due process of law and its property would be taken for public use without due compensation contrary to Article V of the Amendment to the Constitution of the United States, and it would be deprived of its property without due process of law and would be denied the equal protection of the laws contrary to Article XIV, Section 1 of the Amendments to the Constitution of the United States.

Wherefore this defendant asks that the amended complaint be dismissed.

Defendant Rolla Wells, receiver of the United Railways Company of St. Louis, filed his separate answer which was afterward refiled as the joint answer of said defendant and defendant United Railways Company of St. Louis and (omitting caption and signatures) is in words and figures as follows:

SEPARATE ANSWER OF DEFENDANT ROLLA WELLS

Comes now Rolla Wells, receiver of the United Railways Company of St. Louis, one of the defendants in the above-entitled cause, and for his separate answer to the complaint filed herein, says:

1. This defendant admits that complainant is the mayor of the City of St. Louis, Missouri.
2. This defendant admits, on information and belief, that the [fol. 60] Wabash Railway Company is a common carrier, and as such owns and operates a line of steam railroad in and through the City of St. Louis, but this defendant has no knowledge or information sufficient to form a belief as to whether said Wabash Railway

Company is a corporation existing under and by virtue of the laws of the State of Missouri, and he, therefore, neither admits nor denies said allegation.

This defendant admits that the United Railways Company of St. Louis is a corporation organized under the laws of the State of Missouri as a common carrier of passengers for hire, and that it owns a line of street railways in the City of St. Louis, and that this defendant, Rolla Wells, is the duly appointed and qualified receiver of the United Railways Company of St. Louis, and, as such, is now operating the property of said company in said city.

3. This defendant admits that the tracks of the Wabash Railway Company cross Delmar boulevard at grade; admits that the tracks and rails of said Wabash Railway Company are laid at grade where same intersects Delmar boulevard; admits that said tracks are used by said company for the passage of trains, both freight and passenger, over and across Delmar boulevard, but he has no knowledge or information sufficient to form a belief as to whether said tracks are continually used by said company for the passage of trains, and he, therefore, denies said allegation; admits that Delmar boulevard is an open, public and much-traveled thoroughfare in the City of St. Louis; admits that he, Rolla Wells, as receiver of the United Railways Company of St. Louis, maintains and operates street cars for the carriage of passengers for hire over and along Delmar boulevard [fol. 61] at grade, over and upon tracks, which, at said point, intersect and cross the tracks of the Wabash Railway Company at grade but this defendant avers that he has no knowledge or information sufficient to form a belief as to whether the use of said thoroughfare by pedestrians and vehicles and the use of the tracks of the Wabash Railway Company for trains and the use of the tracks of the United Railways Company of St. Louis for street cars, by this defendant as receiver of said company, all on the same grade, render said crossing unsafe and dangerous to travel along said highway, and he, therefore, denies said allegations; and this defendant further avers that he is without knowledge or information sufficient to form a belief as to whether or not a separation of the said grades, mentioned in paragraph 3 of the complaint, is practicable, and he, therefore, denies said allegations.

Wherefore, this defendant prays that the complaint be dismissed.

Defendant, Chicago, Rock Island & Pacific Railroad Company, filed its motion to require portions of said complaint to be made more definite and certain, which said motion (omitting caption and signatures) is in words and figures as follows:

MOTION OF DEFENDANT CHICAGO, ROCK ISLAND AND PACIFIC RAILWAY COMPANY TO MAKE AMENDED COMPLAINT MORE DEFINITE AND CERTAIN

Comes now the Chicago, Rock Island & Pacific Railway Company, designated as the Chicago, Rock Island & Pacific Railroad in the amended complaint herein, and respectfully asks the Commission to make an order requiring the complainant to make paragraph 2 of his amended complaint more definite and certain by stating fully and in detail in what manner "the plan and method of separation of grades at Delmar boulevard" where the tracks of the Wabash Railway Company cross said street "will in the very nature of things, affect the method and manner of any change of grade that may hereafter be ordered or made of the tracks of the Chicago, Rock Island & Pacific Railway Company," as alleged in said complaint, and by setting out in or attaching to the amended complaint herein filed, any plan or scheme proposed by the City of St. Louis and the complainant which affects the property, tracks and right of way of this defendant, and has relation to, or includes as a part thereof, the separation of grades at said Delmar boulevard.

As grounds for this motion this defendant states that said amended complaint indicates, and this defendant is informed and believes, that said plans of said City, and of complainant, constitutes a complete and indivisible plan greatly and permanently affecting the rights and interests of this defendant, and this defendant further shows to the Commission that it is necessary that the complaint be made to state said plan and how the proposed separation of grades at Delmar boulevard will affect the method and manner of changing the grade of the tracks of this defendant, in order that this defendant may be informed as to the nature of the complaint against it and may properly and intelligently protect its rights and interests in the [fol. 63] premises and make answer to said amended complaint.

In compliance with said motion, a supplement to the amended complaint was filed, which (omitting caption and signatures) is in words and figures, as follows:

SUPPLEMENT TO AMENDED COMPLAINT

Comes now the complainant, Henry W. Kiel, and in compliance with the motion of the Chicago, Rock Island & Pacific Railway Company heretofore filed herein, and supplementing his amended complaint, says:

That the tracks and right of way of the defendant, Chicago, Rock Island & Pacific Railway Company, connected with the tracks of the defendant, Wabash Railway Company, at or near Union boulevard and Lindell boulevard in the City of St. Louis; that the granting of an order to separate the grade of Delmar boulevard and the tracks of the Wabash Railway Company as prayed for will fix and determine the method by which the grade crossings of the Wabash Railway Company at Lindell boulevard and at other points south of Delmar boulevard can be thereafter determined, by limiting the method of such elimination to a plan including the depression of the tracks of the Wabash Railway Company; that if the grade crossing of the Wabash Railway Company at Delmar boulevard is abolished in the manner prayed for by this complaint, any future [fol. 64] order of this Commission to abolish the grade crossings of the Wabash Railway Company at or near Lindell boulevard will necessitate the depression of the Wabash Railway tracks and right of way at Lindell boulevard and will necessitate the depression of the tracks and right of way of the defendant, Chicago, Rock Island & Pacific Railway Company at Lindell boulevard and for some distance westwardly therefrom.

Wherefore, having supplemented his complaint in the manner prayed for, complainant renews his prayer for the relief sought.

Dated at the City of St. Louis, Missouri, this 15th day of March, 1921.

The defendant, Rock Island Railroad Company, thereafter filed its answer to the amended complaint and supplement thereto, which said answer (omitting caption and signatures) is in words and figures as follows:

ANSWER OF THE CHICAGO, ROCK ISLAND & PACIFIC RAILWAY COMPANY TO AMENDED COMPLAINT AND SUPPLEMENT THERETO

Comes now the Chicago, Rock Island & Pacific Railway Company, and for its separate answer to the amended complaint and supplement thereto filed herein, states:

I

This defendant admits the averments of paragraphs 1 of the amended complaint.

[fol. 65]

II

This defendant admits the following averments of paragraph 2 of the amended complaint, to wit: that this defendant is a corporation engaged as a common carrier owning and operating a line of steam railroad in and through the City of St. Louis and State of Missouri, and duly authorized so to do; that its tracks connect with the tracks

of the Wabash Railway Company in the City of St. Louis, and that said connection is at a point near Union boulevard and Lindell boulevard; that the connection between the tracks of said railroads is at grade; that the plan and method of separation of grades at Delmar boulevard of said street and the tracks of the Wabash Railway Company will in the very nature of things affect the method and manner of any change of grade that may hereafter be ordered or made of the tracks of this defendant, particularly at Union boulevard, Lindell boulevard, De Baliviere avenue and other street crossings; this defendant admits the allegations of complainant's supplement to amended complaint, dated March, 15, 1921, to wit:

"That the granting of an order to separate the grade of Delmar boulevard and the tracks of the Wabash Railway Company as prayed for will fix and determine the method by which the grade crossings of the Wabash Railway Company at Lindell boulevard and at other points south of Delmar boulevard can be thereafter determined, by limiting the method of such elimination to a plan including the depression of the tracks of the Wabash Railway Company; that if the grade crossing of the Wabash Railway Company at Delmar boulevard is abolished in the manner prayed for by this [fol. 66] complainant, any future order of this Commission to abolish the grade crossings of the Wabash Railway Company at or near Lindell boulevard will necessitate the depression of the Wabash Railway tracks and right of way at Lindell boulevard and will necessitate the depression of the tracks and right of way of the defendant, Chicago, Rock Island & Pacific Railway Company at Lindell boulevard and for some distance westwardly therefrom."

III

Except as herein expressly admitted, this defendant denies each and every other allegation contained in said amended complaint.

IV

Further answering, this defendant says that the amended complaint of the complainant, as Mayor of the City of St. Louis, to separate the grades of Delmar avenue and the right of way and tracks of the Wabash Railway Company at their point of crossing by means of the proposed viaduct over said railroad right of way and tracks at said point, and to carry Delmar avenue over said tracks upon said viaduct is but a single part of one general scheme heretofore prepared by said City for the separation of the grades of all of the streets and drives which cross the right of way and tracks of said Wabash Railway Company between the east line of Forest Park in said City and the northern city limits of said City, a distance of approximately three miles; and said plans of said City constitute a complete and indivisible plan for the separation of said grade [fol. 67] crossings and which the City proposes and has threatened from time to time to impose upon said defendant. That said com-

plete scheme of the City contemplates, among other things (1) that the present grade of the tracks of said Wabash Railway Company at the point where they cross Delmar avenue shall remain as they now are and that a viaduct shall be constructed over said tracks for the purpose of carrying Delmar avenue upon said viaduct and over said tracks at said point of crossing; (2) that from Delmar avenue northwardly to the city limits the present roadbed of said defendant shall be elevated upon an earthen embankment to a height of approximately fifteen feet above the present grade of the roadbed and that the railroad tracks shall be carried over the intersecting public streets and highways by means of bridges constructed in such streets or highways; (3) that south of Delmar avenue, between said avenue and the point where said railroad intersects the east line of Forest Park, the present grade of said defendant's railroad is to be depressed by excavation into a ditch of varying depths reaching at some points a maximum point of twenty-five (25) feet below the present grade of said defendant's roadbed and extending said ditch or excavation into and through Forest Park in said city, and that within said limits the intersecting streets and drives are to be carried over the tracks of said defendant by means of overhead bridges; (4) that from the point where said defendant's railroad intersects the east line of Forest Park to the point where said defendant's railroad intersects the north line of Forest Park at Lindell avenue, said plan proposes unlawfully and forcibly to take from said defendant and from this defendant, [fol. 68] The Chicago, Rock Island & Pacific Railway Company, which has trackage rights over the tracks of said Wabash Railway Company, their present right of way and deprive them of their right of way without compensation therefor, and to move said tracks and roadbed therefrom; (5) that from the point where said defendant's railroad intersects the north line of Forest Park and the south line of Lindell avenue to a point on defendant's right of way north of Lindell avenue and west of Union avenue said plan would unlawfully and wrongfully force and compel said Wabash Railway Company and this defendant to vacate and abandon their present right of way without compensation therefor and would unlawfully and wrongfully require and compel said Wabash Railway Company and this defendant to acquire another and different right of way for the operation of their railroads.

And defendant further says that the matter of separating the grade crossings of defendant, Wabash Railway Company's right of way and tracks and the intersecting streets and drives between the east line of Forest Park and the northern city limits has been the subject of controversy between said defendant, Wabash Railway Company, and the City for the past several years and the City has at all times claimed and insisted that the only plan or scheme for the separation of the grades of the intersecting streets, between Delmar avenue on the north and the east line of Forest Park on the south, that would be accepted or proposed by said City is the plan above described, requiring the depression or excavation of said defendant's roadbed, as [fol. 69] well as the tracks and roadbed of this defendant at and between De Baliviere avenue and Union boulevard, in the manner

shown by the City's plans therefor and heretofore generally described; whereas, on the other hand, said defendant, Wabash Railway Company, has insisted and now insists that the proposed plan of said City to require said defendant to depress its roadbed and tracks between Delmar avenue on the north and the east line of Forest Park on the south and to vacate and abandon a part of its roadbed and right of way as aforesaid will wholly destroy that part of said defendant's railroad and constitute a confiscation thereof.

This defendant further states that it owns and operates a line of railway extending from the westerly limits of said City in an easterly direction to a point at or near De Baliviere avenue, from which point its right of way and tracks parallel the right of way and tracks of said Wabash Railway Company as far as Union boulevard, at or near which point the tracks of this defendant join those of the Wabash Railway Company, and over the tracks of which said Wabash Railway Company this defendant operates its trains through Forest Park and thence to the Union Depot, and that the proposed plan of said City to require this defendant and the Wabash Railway Company to depress said roadbed and tracks south of Delmar avenue and through Forest Park would wholly destroy that part of the railroad of this defendant and that of said Wabash Railway Company and constitute a confiscation thereof, because of the exceptional physical conditions under which said work would have to be done and the conditions under which that part of said railroad would have to be thereafter operated and maintained.

[fol. 70] This defendant further says that any order of this Commission which requires said defendant, Wabash Railway Company, to construct or which permits the City of St. Louis to construct a viaduct upon Delmar avenue and over the right of way and tracks of said defendant as proposed in the amended complaint herein will irrevocably fix and determine that all subsequent separation of the grade crossings aforesaid, between Delmar avenue on the north and the east line of Forest Park on the south, shall be accomplished by the depression of the roadbed and tracks of this defendant and of the Wabash Railway Company substantially as provided for by the present plans of the said City as above described, and will forever conclude this defendant and the Wabash Railway Company from thereafter asserting their right and claim to accomplish the separation of such grade crossings, if and when the same shall lawfully be required, by means of elevating the roadbed and tracks of this defendant and Wabash Railway Company to such height and in such manner as this Commission may hereafter require or approve.

This defendant says that the complainant herein as the Mayor and representative of the City of St. Louis well knows that, once a viaduct is constructed upon Delmar avenue and over and across the right of way and tracks of Wabash Railway Company as proposed in this proceeding, this defendant and said Wabash Railway Company will thereby forever thereafter be concluded from asserting any right or claim or any possibility of thereafter separating the grades of intersection streets and drives between Delmar avenue on the north and the east line of Forest Park on the south by means

[fol. 71] of the so-called elevation plan, and that one of the chief purposes of the complaint in this cause is to secure an order from this Commission requiring said defendant Wabash Railway Company to construct or permit the City of St. Louis to construct the proposed viaduct on Delmar avenue and thereby to forever conclude this defendant, the Wabash Railway Company and the City of St. Louis from thereafter claiming any right to elevate the roadbed and tracks of this defendant and said Wabash Railway Company between Delmar avenue on the north and the east line of Forest Park on the south, for the purpose of accomplishing such separation of intersecting grade crossings as may be hereafter lawfully required from time to time.

This defendant says that forasmuch as the proposed viaduct is but a single item of a complete and comprehensive plan of the City of St. Louis for the separation of the grades of other streets, highways and drives intersecting the right of way and tracks of this defendant and tracks of Wabash Railway Company used by this defendant between the east line of Forest Park and the western city limits of said City, that this Commission should in equity and good conscience inquire into and determine the lawfulness, reasonableness and practicability of the entire scheme of said City as well as the reasonable necessity for any separation of grades of Delmar avenue, or of any other streets or highways or drives and the right of way of this defendant within the boundaries covered by the said plans of said City, or that will in the immediate future be affected thereby. [fol. 72] This defendant further says that any order of said Commission requiring the separation of the grade crossing at Delmar avenue by means of a viaduct as proposed in the amended complaint herein will by its necessary effect require this defendant presently or in the future to depress its roadbed and tracks between De Baliviere avenue on the north and the north line of Forest Park on the south, and to abandon its present right of way over the tracks of the Wabash Railway Company through Forest Park as aforesaid, and will thereby result in entirely destroying that part of the railroad of this defendant between said boundaries and constitute a denial of this defendant's right to use its right of way and railroad between said boundaries, and a confiscation thereof without due process of law, contrary to Article II, Section 30 of the Constitution of the State of Missouri, and Article XIV, Section 1 of the Amendments to the Constitution of the United States, and will unlawfully restrict and prevent the future exercise of the powers of this Commission or its successor to determine, after a hearing, the time when and mode or manner whereby, such separation of said grade crossings shall be accomplished.

V

Further answering, this defendant says that it heretofore acquired its present right of way through the City of St. Louis to the north line of Forest Park near Union boulevard and Lindell avenue by purchase, transfer and deed dated January 1, 1905, to it from its predecessor in title and interest, The St. Louis, Kansas City & Colo-

[fol. 73] rado Railroad Company, including all right, title and interest of its said predecessor in and to the joint and equal use of the railroad and terminals of the defendant Wabash Railway Company from a point on the north line of Forest Park to Eighteenth Street in said City of St. Louis, hereinafter referred to. That said defendant Wabash Railway Company heretofore acquired its present right of way through Forest Park, now in the City of St. Louis, by purchase, transfer and assignment to it by its predecessor in title and interest, the St. Louis County Railroad Company; that said right of way was acquired by the said St. Louis County Railroad Company and is now held by said defendant Wabash Railway Company under and by virtue of an Act of the General Assembly of the State of Missouri, approved March 25, 1874, entitled, "An Act to establish Forest Park" (Laws Missouri, 1874, p. 371). That said Act, among other things, provides that the grade of said railroad so far as the same runs through Forest Park shall be approved by the Park Commissioners appointed and acting by virtue of the authority conferred by said act. That thereafter, and before the railroad of said defendant Wabash Railway Company was constructed upon the said right of way through Forest Park, its predecessors and the said Park Commissioners entered into valid and binding agreement, in writing, fixing the location of said right of way and providing that said defendant's predecessors and its successors and assigns, including this defendant, should have and enjoy all of the rights, privileges, immunities, franchises, improvements and property set forth in said agreement continuously and forever, and that no material alteration or change should be per- [fol. 74] mitted in said tracks without the consent of all the contracting parties thereto, and said railroad was thereafter constructed upon said right of way through said park upon the grade approved by said Park Commissioners and agreed upon by the parties to said agreement, and has ever since been operated and maintained on said right of way and at said grade, and neither this defendant nor its predecessor nor the Wabash Railway Company or its predecessors have ever consented to the material alteration and change proposed and required by the said plan of the City.

This defendant says that the said right of way through said Forest Park was acquired by defendant, Wabash Railway Company's predecessor, the St. Louis County Railroad Company, and by the grantors of said defendant, Wabash Railway Company, and the right to use said right of way by this defendant and its predecessor was acquired for a valuable consideration, and the aforesaid Act of the General Assembly of the State of Missouri and the agreement between the predecessors of said Wabash Railway Company and the Forest Park Commissioners as aforesaid, constitute valid and binding contracts between the State of Missouri and said Wabash Railway Company and this defendant, and are valid and binding upon the City of St. Louis. And defendant says that any order of this Commission requiring said Wabash Railway Company and this defendant to change the present right of way or the present grade of said railroad, or any part thereof, as the same is now constructed and operated upon said right of way through Forest Park, will constitute a viola-

tion of the said contract rights of said Wabash Railway Company [fol. 75] and this defendant and impair the obligations of the contracts between the State of Missouri and said Wabash Railway Company and this defendant, and between the Commissioners of Forest Park and said Wabash Railway Company and this defendant contrary to the provisions of Section 10 of Article I of the Constitution of the United States, and said Wabash Railway Company and this defendant would thereby be deprived of valuable and lawful rights and privileges and their property would be taken thereby and damaged for public use without just compensation, in violation of Article II, Section 21 of the Constitution of the State of Missouri, and they would be deprived of their property without due process of law in violation of Article II, Section 30 of the Constitution of the State of Missouri, and would be denied the right of trial by a jury on their claim for compensation for their property so taken and damaged contrary to Article XII, Section 4 of the Constitution of the State of Missouri, and would be deprived of their property without due process of law, and their property would be taken for public use without due compensation contrary to Article V of the amendments to the Constitution of the United States, and they would be deprived of their property without due process of law and would be denied the equal protection of the laws contrary to Article XIV, Section 1 of the Amendments to the Constitution of the United States.

VI

Further answering, this defendant says that under the provisions of said Act of the General Assembly of the State of Missouri, ap- [fol. 76] proved March 25, 1874, said Park Commissioners entered into a tripartite agreement, dated August 11, 1875, with said St. Louis County Railroad Company and the St. Louis, Kansas City & Northern Railway Company, the grantors and predecessors in title and interest of said defendant, Wabash Railway Company, by which it was agreed and provided that said St. Louis County Railroad Company should permit under such reasonable regulations and terms as might be agreed upon, other railroads to use its right of way through Forest Park and up to the terminus of its road at Union Station in the City of St. Louis, upon such terms and for such fair and equitable compensation to be paid to it therefor as might be agreed upon by such companies; that the St. Louis, Kansas City & Colorado Railroad Company, which was the grantor and predecessor in title and interest of this defendant, under and by virtue of said tripartite agreement and a decree of the Circuit Court of the United States for the Western District of Missouri entered on or about December 13, 1886, in case of *Central Trust Company v. Wabash, St. L. & P. Ry. Co. et al.* (29 Federal Rep. 546, affirmed 138 U. S. 1), was granted the right to use the right of way and tracks, side tracks, switches, turn-outs, turntables, and other terminal facilities of said defendant, Wabash Railway Company and its predecessors in title between the north line of Forest Park and Eighteenth street in the City of St. Louis at twenty-five hundred dol-

lars (\$2,500.00) per month; and said decree further provided that the expense per annum of maintaining the said right of way and other property pending such joint use thereof, including all taxes [fol. 77] upon said property, should be borne by the said Wabash, St. Louis & Pacific Railway Company, the predecessor and grantor of said defendant, Wabash Railway Company, and the said St. Louis, Kansas City & Colorado Railroad Company, predecessor of this defendant, in the proportion that the number of wheels each of said companies shall cause to be passed over the main tracks, or parts thereof, on said right of way per annum, bears to the total number of wheels that both of said companies shall cause to be passed over the same during each year pending the said period of such joint use, and that this expense shall be paid at the expiration of each year; that the said right of way and tracks thereon and other terminal facilities shall be maintained and kept in good repair by the Wabash, St. Louis & Pacific Railway Company. And the said decree further provided that said St. Louis, Kansas City & Colorado Railroad Company shall enjoy the equal use and benefit of said right of way, tracks, switches, side tracks, turn-outs, turn-tables, and other terminal facilities with said Wabash, St. Louis & Pacific Railway Company or its said receivers, and the said Wabash, St. Louis & Pacific Railroad Company and all persons claiming by, through, or under it, and their agents, servants, counsels and employes were perpetually enjoined and restrained from in any manner refusing to permit the said intervenor, the said St. Louis, Kansas City & Colorado Railroad Company, its successors or assigns, from using with its or their engines and cars the said rights of way, tracks, switches, side tracks, turn-outs, turn-tables, and other terminal facilities of said Wabash, St. Louis & Pacific Railway Company between the north line of Forest Park and said Eighteenth street, on the [fol. 78] terms therein above set forth in said decree, in and for the transaction of its or their business, and in the operation of its or their road. Said decree further provided that the said St. Louis, Kansas City & Colorado Railroad Company should have the right to make connection with the tracks of said predecessor of defendant, Wabash Railway Company at the north line of Forest Park, and to use the said right of way, tracks, switches, side tracks, turn-outs, turn-tables, and other terminal facilities of said Wabash, St. Louis & Pacific Railway Company, or anyone claiming by, through or under it, as to the same, between the north line of said park and said Eighteenth street, on the terms, in the manner and subject to the regulations in said decree set forth in and for the transaction of the business and in operation of the road of said St. Louis, Kansas City & Colorado Railroad Company, its successors or assigns; that after the entering of said decree, said St. Louis, Kansas City & Colorado Railroad Company, the predecessor and grantor of this defendant, entered into the use of this defendant's right of way, tracks and facilities from the north line of Forest Park to Eighteenth street in the City of St. Louis, as provided in and under the terms of said decree, and it and this defendant have ever since, and this de-

fendant now is using the said right of way, tracks and facilities of said Wabash Railway Company and is paying said defendant for such use as provided in said decree; that the use of said right of way tracks and facilities by this defendant is a valuable right which this defendant is entitled to use and enjoy under the terms and provisions of said tripartite agreement and said decree of court. This defendant further states that the said plan of the City of St. [fol. 79] Louis for the separation of grades at Delmar boulevard will necessitate and require that at the point where the tracks of this defendant connect with the tracks of the Defendant, Wabash Railway Company, the tracks of this defendant shall be sunk or depressed into a ditch approximately twenty-five (25) feet below the present level of said connection, and will necessitate and require that this defendant shall sink or depress its tracks west of the point of said connection and that such depression of its tracks, if made, would subject this defendant's tracks to the flood waters of the River Des Peres; that a short distance west of said connection the tracks of this defendant cross over the River Des Peres; that it would be wholly impracticable for this defendant to operate its railroad over said River Des Peres, and through the ditch or excavation and at the grade provided and required by the plan of said City, and that as a result thereof this defendant would be compelled to abandon, or greatly decrease the operation of its trains over its said track and upon the right of way of said Wabash Railway Company, and this defendant would thereby be deprived of valuable rights and privileges, which it now enjoys, in the use of said right of way and tracks and terminals of said Wabash Railway Company, and its property would be thereby taken and damaged for public use without just compensation, in violation of Article II, Section 21 of the Constitution of the State of Missouri, and it would be deprived of its property without due process of law in violation of Article II, Section 30 of the Constitution of the State of Missouri, and would be denied the right of trial by a jury on its claim for compensation for its [fol. 80] property so taken and damaged, contrary to Article XII, Section 4 of the Constitution of the State of Missouri, and would be deprived of its property without due process of law, and its property would be taken for public use without due compensation contrary to Article V of the Amendments to the Constitution of the United States, and it would be deprived of its property without due process of law, and would be denied the equal protection of the laws contrary to Article XIV, Section 1 of the Amendments to the Constitution of the United States.

VII

This defendant further states that it is now and has been for many years past, a railway corporation, duly organized and existing under and by virtue of the laws of the States of Illinois and Iowa, and is duly authorized to do business in the State of Missouri, and has been and is now the owner of a system of railway extending from the City of Chicago in the State of Illinois and from the City of St.

Louis in the State of Missouri, into and through the States of Illinois, Iowa, Nebraska, Colorado, Missouri, Kansas, Oklahoma, Arkansas, New Mexico and other states, and with its connecting carriers forms a through line of railroad from the cities of Chicago and St. Louis to the Pacific Coast and points in Texas, and to points in Colorado, and that its business consists largely of transporting large quantities of freight and large numbers of passengers and the United States mails from one state to another, and between the states over its lines of railway; that it is a common carrier for hire, devoting its said railway to the public use in transporting freight and passengers and the mails of the United States from one place to another over its said [fol. 81] railway; that the proposed action of the complainant herein, and the City of St. Louis in separating grades at Delmar avenue in St. Louis would necessarily result in later on requiring this defendant to depress its tracks and railway between DeBaliviere avenue and Union boulevard in the City of St. Louis in order to continue the use of its railway over the tracks of the Wabash Railway Company from the north line of Forest Park to the Union Station, creating an intolerable burden in operating conditions and subjecting its said railway to floods from the Des Peres River, and would be a direct, unreasonable, arbitrary, unlawful and unwarranted interference with the railroad and property of this defendant, and with the interstate business of this defendant, and that it would endanger and interfere with the operation of its trains between St. Louis and points in Kansas, Colorado, Oklahoma, Texas and other states and to Pacific Coast points, which trains are operated and maintained primarily for the purpose of transporting the interstate traffic of passengers and property and the carriage of the United States mails, and that the operation of this defendant's railway would be greatly impeded and impaired, and the expense of such operation would be greatly increased without any benefit to the public, and that such action of the complainant and the City of St. Louis would thereby cast a direct burden upon interstate commerce.

Wherefore this defendant prays that the amended complaint herein be dismissed.

[fol. 82] The defendant, The Laclede Gas Light Company, formally acknowledged receipt of summons and entered its appearance in writing, said entry of appearance (omitting caption and signatures) being in words and figures as follows:

The Laclede Gas Light Company acknowledges the receipt of summons in the above-entitled cause, and enters its appearance.

Defendant, Southwestern Bell Telephone Company, filed its answer, which (omitting caption and signatures) is in words and figures, as follows:

ANSWER OF DEFENDANT SOUTHWESTERN BELL TELEPHONE COMPANY

Now comes the Southwestern Bell Telephone Company, one of the defendants herein, and for answer states:

This defendant is not advised as to the necessity of the construction of a viaduct at the Wabash tracks on Delmar boulevard in the City of St. Louis, nor whether said plan is feasible, or necessary at this time.

This defendant states that if any such plan as that outlined in the amended complaint is carried out, it will be very expensive for this defendant and will cost a large sum of money, estimated by its engineers to be somewhere between \$75,000 and \$100,000.

This defendant states that it has a right to have its construction in the place where it is at present; that it is thoroughly satisfied with the location of its construction and that the moving of its construction [fol. 83] will not add anything to the safety or convenience of its conduit, cables and other construction used in the giving of service to its patrons.

This defendant further represents to the Commission that there is such a great demand for telephone service at the present time throughout the entire territory in which this company is operating that it is in many places practically impossible to furnish all the service that is required. That because of the financial condition in the country it is difficult to obtain the necessary funds with which to make necessary additions to its property to serve the people who are demanding telephone service, and that to compel this company to spend \$75,000 or \$100,000 additional at this time for work which is not essential in so far as the interests of the telephone users of the City of St. Louis are concerned would be to still further handicap this company in the giving of telephone service in the State of Missouri.

This defendant further suggests to the Commission that should any order be made herein, proper provision should be made to take care of the construction of this defendant, both temporary and permanent, in any change that is ordered, and that should a viaduct be erected as asked for by the City of St. Louis, that space on said viaduct to carry all present and future construction of this defendant be provided for without additional charge to this defendant.

Wherefore, defendant, Southwestern Bell Telephone Company, prays that upon final hearing herein such proper orders will be entered as will protect its interests in the premises.

[fol. 84] The defendant, Kinloch Telephone Company, filed its answer, which (omitting caption and signatures) is in words and figures, as follows:

ANSWER OF THE KINLOCH TELEPHONE COMPANY

Now comes the Kinloch Telephone Company and in answer to the petition in the above entitled cause states, that to its knowledge, it has no poles, wires or other equipment on Delmar avenue, St. Louis, Missouri, at the intersection of the Wash tracks, and therefore, is not interested in the matters contained in said petition.

The defendant, The City of St. Louis, filed its answer, which (omitting caption and signatures) is in words and figures, as follows:

SEPARATE ANSWER OF DEFENDANT, THE CITY OF ST. LOUIS

Comes now the City of St. Louis, defendant in the above-entitled matter, and for its answer says that it admits the averments in the complaint herein filed by Henry W. Kiel, Mayor, and prays the Commission to order the separation of grades therein described by an appropriate order directing the separation of the grades at said point by elevating Delmar boulevard over and above the tracks of said Wash Railway Company, and that the Street Railways Company, and the other utilities, be required to adjust themselves to the new grade of Delmar boulevard that may be established by such order.

[fol. 85] STATE OF MISSOURI:

PUBLIC SERVICE COMMISSION

Hearing held by the Public Service Commission February 21 and 23, 1921, in the matter of separation of grades of Wash Railway Company et al. at Delmar avenue, St. Louis, Missouri.

Present: Edwin J. Bean, Noah W. Simpson and Edward Flad, Commissioners.

Case No. 2732

HENRY W. KIEL, Mayor of the City of St. Louis, Complainant.

vs.

WABASH RAILWAY COMPANY, a Corporation; ROLLA WELLS, Receiver of United Railways Company of St. Louis, a Corporation; The City of St. Louis, a Municipal Corporation; Chicago, Rock Island & Pacific Railway Company, a Corporation, and United Railways Company of St. Louis, a Corporation, Defendants.

APPEARANCES OF COUNSEL

For complainant, Hon. Chas. H. Daues, City Counselor.

For defendant, Wash Railway Company, Messrs. N. S. Brown and Homer Hall.

For intervenor, C. H. Rodenhaver, Esq.

[fol. 86] At the hearing of above-entitled case the following proceedings were had:

Commissioner Flad asked that names of those desiring to enter appearance be given. Thereupon the names of Messrs. Daues and Senti, representing the City of St. Louis, Messrs. N. S. Brown and Homer Hall, the Wabash Railway Company, Mr. C. H. Rodenhaver the West End Grade Crossing Association., and Messrs. A. L. Shapleigh, Grines and Minnis from Portland place, A. G. Garrett, F. H. Gerhart, the Delmar avenue property interests were given.

Commissioner Bean asked whether the City of St. Louis had filed its answer, and Mr. Daues replied that it was made a defendant so that it could be properly brought into the case and said: "If no answer has been filed by the City, I will now confess for the City the complaint."

Commissioner Flad stated that the answer could be filed later.

L. R. BOWEN, being duly sworn, testified as follows:

Direct examination by Mr. Daues.

My name is L. R. Bowen; I am engineer of bridges and buildings for the City of St. Louis; have been engineer of bridges since 1911 and engineer of buildings since 1918. Have been employed in engineering work for the City for 13 years.

Q. Mr. Bowen, what training did you have to qualify you as an engineer?

A. I was three years with the American Bridge Company and [fol. 87] thirteen years with the City of St. Louis.

Q. Did you ever attend any school of engineering?

A. I attended Washington University, but did not complete my course. I am a trained engineer now.

Q. Now, in your own way, Mr. Bowen, just give the general idea to the Commission as to what this proof will be; just a bird's-eye view; where is Delmar avenue?

A. Delmar avenue runs east and west crossing the western city limits, and runs midway between the north and south part of the City, about four or five blocks north of the north line of Forest Park; it is 100 feet wide; the nearest east and west street that goes through is Maple avenue, about six blocks north; it is 60 feet wide. The nearest through street south that goes east and west is Waterman avenue. There are a number of east and west streets between Delmar and the north line of Forest Park, only two of which cross the Wabash tracks—Waterman and Kingsbury—with Hamilton making the curve. Hamilton, running north and south, curves into Kingsbury. Kingsbury and Hamilton are 60 feet wide and Waterman is 80 feet wide.

Q. Delmar boulevard, is that a paved street?

A. Paved east of De Giverville and paved west of Rosedale; but at the point of the crossing it does not have a hard paving. The City

has laid asphalt paving on either side of the street car tracks to make a temporary paving. This paving consists of two strips 12 feet wide. The paving the City has placed extends to the east line of De Giverville, about 300 feet east and about 500 feet west of the crossing.

Q. Mr. Bowen, have you examined the records to determine whether Delmar boulevard was a legal street before the tracks of [fol. 88] the Wabash were laid?

A. Yes. That was known as Bonhomme road, and was opened across the point where the Wabash now runs, in 1849, by decree of the court. That was before the separation of the City and county. I have not looked up the date when the tracks were laid.

(Mr. Brown: In 1875.)

Q. So what is now Delmar boulevard was an open, public highway before the Wabash tracks were laid?

A. Yes, sir; it was.

Q. Is Delmar boulevard a large travel street?

A. A very heavy traffic along Delmar boulevard and over the Wabash tracks.

Q. Has the City made an actual count for the purposes of this suit to determine the volume of traffic on Delmar, both vehicular and pedestrian?

A. Yes, sir; October 11th, 13th, 14th, 15th, 16th and 18th, 1920. The check was made by men regularly engaged as traffic counters; trained men. They made the count from 7 a. m. to 11 p. m., a sixteen-hour count.

Q. At this point does the street railway cross the railway tracks of the Wabash?

A. Yes, sir; the United Railways Company maintains two tracks at that point; the Olive-Delmar, the City Limits, Creve Cœur line and formerly the Clayton line cross there, but I think it stops now, in the last thirty days, on Skinker.

Q. Has a count been made of the number of street cars crossing those tracks?

A. At the same time they also made a count of the street car movements along the railroad tracks.

Q. From an average of passengers that might be computed, about [fol. 89] how many people pass those tracks by day?

A. Thirty-three thousand per day.

Q. At this point are the Wabash Railway tracks and the street railway tracks all at the same grade?

A. Yes, sir.

Q. What is the character of trains, either passenger or mixed, of the Wabash; all passengers or mixed?

A. Most of the trains are passenger trains. I think the regular schedule is about seven freight trains a day and fourteen passengers.

Q. Where is the station of the Wabash with reference to Delmar boulevard, in distance?

A. The Wabash station now extends on to the limits of Delmar boulevard on the north side of the street and the west side of the right of way.

Q. Trains going north on the tracks and stopping to discharge passengers, do they necessarily block the street?

A. Yes, sir.

Q. Then every train which has one or more coaches going north necessarily blocks Delmar boulevard when it stops?

A. Long northbound trains frequently stop so as to block Delmar boulevard, and the same situation coming south. The locomotive passes Delmar before it stops. We have made an estimate of loss of time in some cases that results from the blocking of Delmar boulevard, and am prepared to give the time that is lost each day, an estimate of it so the Commission may determine what economic losses result therefrom.

Q. Have you made an examination to determine whether there have been accidents and near-accidents? By near-accidents, I mean where there has been, for instance, an automobile stopped by crash-[fol. 90] ing through the gates just in time to avoid accident at this point?

A. Yes, sir; we have made such investigation; I have examined the police reports over a period of about five years. Delmar boulevard is 100 feet wide and is the principal east and west street in that neighborhood, and with the absence of this danger should carry the main traffic east and west in that vicinity.

Q. Tell the Commission what is the general lay of the land there with reference to the River Des Peres, and whether the tracks at the point where they cross Delmar are high or low; whether the street going east and west from the Delmar crossing goes up or down; give general location of Delmar, the tracks and the river?

A. The Wabash Railway tracks cross Delmar boulevard between Hamilton and Skinker; about 1,000 feet west of Hamilton and 1,500 feet east of Skinker; Delmar rises in each direction from Wabash tracks; very mild grade immediately east and west of tracks.

The River Des Peres crosses Delmar immediately west of the Wabash tracks, then runs almost directly south into Forest Park, leaving the Wabash at this particular point. The land south of Delmar is higher than Delmar boulevard. West of the Wabash tracks, the land to the north lies about same grade with Delmar; but the land east of Delmar, crossing, going towards the north rises, so that Hamilton avenue forms a ridge very much higher than the Wabash, running northwardly to grade of about 1.25 at Easton, and the land slopes down towards the Wabash and the River Des Peres. North of Delmar and west of the Wabash tracks it is industrial property all the way out to the city limits, principally coal, [fol. 91] gravel and sand yards. Immediately adjacent to the north side of Delmar the property is undeveloped, from Hodiament to Olive Street road. East of Hodiament and north of Delmar is high-class residence district as far north as Cates avenue. At that point Hodiament diverts to the east and between that and the Wabash tracks is industrial development and that parallels all the way out to Page boulevard. South of Delmar there is very high-class residence district. No industries between Delmar and Kingshighway and Wabash tracks, residences on both sides of the Wabash track.

Running southeastwardly the Wabash crosses Hamilton and Waterman, and when it gets to De Baliviere, it runs east on a line about 560 feet north of the north line of Forest Park to a point near Union, when it swerves to the southeast and crosses north of the intersection of Union and Lindell, and then extends through the park. It enters Forest Park east of Union boulevard, at Lindell boulevard. Did not examine records to ascertain when it entered that park; don't know when that property became Forest Park. Am familiar with zoning ordinances in the City of St. Louis to some extent; that is, the ordinance intended to fix real estate for future building purposes, either industrial or residence property.

Q. What is the class under the zone law of that property south of Delmar near the Wabash tracks?

A. All classed as residence property, either first or second class. It is considered the best residence property in St. Louis; industries are absolutely excluded from that property.

Q. If the Commission should find that this is a dangerous crossing, have you worked out a plan?

A. Yes, we have spent ten years on this problem, on these Wabash [fol. 92] tracks and grade crossings; the plan the City presents today is practically the same it has agitated and proposed for the last ten years. At present we are simply asking that a viaduct be constructed over Delmar boulevard, leaving the tracks as they are. The City's plan for the separation of the grades provides for elevating the tracks north of Delmar boulevard and depressing the tracks south of Delmar. We are now asking for the construction of a viaduct on Delmar boulevard for two reasons: First, the cost of doing the work is exceedingly high, however the necessity for eliminating the grade crossing is so great that we believe we are more than justified in going to the expense at the present time. South of Delmar boulevard the tracks could be depressed without any danger of overflow from the River Des Peres. We think we can prove that beyond any shadow of doubt; if we didn't, we would not be here. We want to consider everything and do it in the most thorough way possible, whether the River Des Peres sewer is built or is never built; but to eliminate the grade crossing by depressing the tracks south of Delmar boulevard and providing for flood such as we had in 1915 will cost about \$300,000 more before the River Des Peres sewer is built than it will after it is built; and we are in hopes that before we have to ask the Commission to depress the tracks south of Delmar, we will have this condition eliminated even with a recurrence of that wonderful storm of August, 1915. Our plan contemplates a bridge along Delmar boulevard over the tracks.

Q. What sort of bridge do you propose to erect, and where do [fol. 93] you begin to raise, and why is it proper that you begin as far back as you do?

A. The City's plan for the elimination of the Wabash grade crossing on Delmar boulevard provides for raising Delmar boulevard on earthen embankment to begin at a point 235 feet west of Hamilton avenue, and extend to a point about 300 feet west of Rosedale.

Commissioner Bean:

Q. What is the total length of the elevated structure?

A. I will have to figure that; I can bring that out later. There would be a bridge over the Wabash tracks, bridge 77 feet wide; two spans of 38 feet 6 inches. The proposed grade along Delmar is $2\frac{1}{2}$ per cent.

Commissioner Bean:

Q. What is the width of the elevated structure?

A. It would be raised the entire width of Delmar boulevard 100 feet wide by raising with earthen embankment. Hodiamont avenue raises from a point 150 feet south of the center line of intersection of Enright with Hodiamont. De Giverville would also have to be raised.

Commissioner Flad:

Q. Do I understand that with your final plan that is to be changed?

A. No, sir; that is to be permanent. The street car line follows the grade of the street; it is proposed to raise the grade of Rosedale at its intersection with Delmar boulevard. Rosedale at this point now extends downwardly towards the north to meet the grade of Delmar, so that when Delmar is raised, Rosedale will have an almost level grade. The raise would be about six feet.

Commissioner Flad:

Q. The only necessity of passing on the balance of the plan now is that if the depressed plan is adopted, this plan stands, and if the elevated plan is adopted, then this would have to be removed?

A. Yes. Assuming that this is permanent, it would be the basis [fol. 94] for the fixing of grades at other points.

Mr. Daues:

Q. We have not made the Rock Island a party defendant to this suit and I want to ask for summons for them during the day. There was a reason for that. Now, you have stated in a general way, Mr. Bowen, what the plan contemplates?

A. Yes.

Mr. Bowen was then excused as Mr. Brown had no questions at this time.

DR. EDGAR M. CARSON, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

My name is Edgar M. Carson; I am a dentist; I am familiar with the neighborhood where Delmar boulevard crosses the Wabash tracks I live west of the neighborhood and cross it twice a day, sometimes

three or four times in an automobile. The traffic along there is exceptionally heavy.

Q. I will ask you if you can remember of having at any time been stopped there by trains, and having narrowly avoided an accident?

A. Well, I was not stopped by the train; I was stopped by an omen, I suppose. This happened on the last Sunday morning of September last year coming home from the Riverview Carnival. Coming over Delmar from Union, I was traveling probably 25 miles an hour; this was about 3 o'clock in the morning, and I always slow down coming towards a crossing for the reason that you will break your springs if you don't; I slowed to 10 miles an hour and looked to my right and noticed a distinct large light and saw the gates were up; I brought my machine to a dead stop and about [fol. 95] that time a through freight went by at 35 miles an hour, with me about as close to the track as I am to you. Just at that time I saw two men run out and throw up their hands as if to stop me. Then I pulled to the other side of the street and asked them why their gates were up; one of the men proved to be the watchman on duty, the other was the night watchman in the neighborhood. Their story was that they never got word of a special train coming through. The phone was ringing in the office and I forget the name of the watchman; he gave it to me and I had made up my mind to report it, then I cooled down by Monday morning, but the gates were up and no warning at all, except three shrill whistles when the engineer saw the gates up and we were so close. The watchman said he did not have any signal for a special train coming through. Fortunately, I was not hurt, but I certainly came very near being.

(Recess taken to 2 p. m.)

JOHN R. WOMACH, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

My name is John R. Womach; I am a policeman of the City of St. Louis and have been since 1906.

Q. Officer, did you, while in the discharge of your duties, ever see a collision at Delmar boulevard and the Wabash tracks?

A. Yes, sir; on the 19th of August, 1919, I saw a collision between a United Railways car and a Wabash train about 10:45 on that night. There was a colored party—full car—went out west, and on the return trip the trolley came off at Delmar and Wabash tracks, [fol. 96] and they were unable to get the trolley on the wire, and this Chicago train that was due there at that time came along and hit the car and injured about three or four people.

Q. Were the gates opened?

A. Well, no; there was no occasion. If this car had gone on, the car would not have been there when the train came there; the car was stopped on the track.

Q. Notwithstanding the fact that the gates were properly operated, it would not have avoided the accident on that occasion?

A. No, sir. The only reason someone was not killed is because the train did not hit the car square. The engineer almost got his train stopped, and it just lifted the car over, and then he backed the train up.

Q. Did you say anyone was seriously injured?

A. I believe the doctor claimed two or three of them were seriously injured. I called an ambulance and patrol wagon, and called for help. I could not say what my report was, but I believe the doctor pronounced two of the cases serious; the others were not serious. Since that time one of them died. I don't know whether as a result of that injury. It was four or five or six months afterwards that Parson's wife died. That case has not been settled yet.

Q. What effort was made to stop that train?

A. One of the supervisors was standing there talking to me, and when the trolley came off I heard that train pull out of Forsythe Junction, and I told him the train was due there, and they could not get the trolley on the wire, and I ran down the track after telling everybody to get off of the car, and I motioned the engineer to slow [fol. 97] the train down, and he did, and I thought he was going to stop; he didn't hit the car, just shoved against it. I testified in court that everyone got off, but in getting off they just walked and tumbled over one another, and after the commotion we found the ones that were injured and called the ambulance. I judge there were thirty-five to forty colored people on the car; it was 10.45 at night; the car was eastbound.

Q. Your understanding is that it is claimed by relatives of this negro woman that she died as a result of this accident?

A. I don't know. I was told by one of the attorneys I would be a witness again.

Cross-examination by Mr. Hall:

That street car was a street car off of the Market Street Line that was being run over the Delmar Line out to Creve Coeur; it was not a regular Delmar car; the trolley equipment was such that it would not reach the trolley wire going over that crossing.

Q. For that reason the car stalled on the track?

A. I suppose, Mr. Hall, when the trolley came off. I don't know what caused it; anyway, they could not get the trolley back on the wire until the train came. Everybody got out and some got hurt while getting out of the car. This happened in August, 1919.

Q. This colored woman who died, died in April of the following year?

A. Some time afterwards; you are the one that told me about it. I don't know what she died of, only what you told me.

[fol. 98] E. R. KINSEY, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

I am president of the Board of Public Service, and have been for several years. I am familiar with the Delmar-Wabash crossing as it now exists.

Q. Tell the Commission in your own language how important a thoroughfare Delmar boulevard is.

A. I will go into that commencing with some statistics made by the City Plan Commission, of which I am ex officio member. We find that the traffic on the streets of St. Louis is increasing from 20 to 25 per cent each year, or, in other words, it will double every four or five years; for that reason it made it of utmost importance that we make provision to care for this increased traffic. We have what we call "major thoroughfares," and Delmar boulevard is one of the major thoroughfares being developed. In the development of that plan there is now in process of completion a connection between Delmar boulevard and Morgan street, on Grand avenue.

Morgan street is under proceedings now as far east as Third street, and the plan being to create Morgan and Delmar major thoroughfares that will carry large volumes of traffic, plus the increase which we see coming.

Washington avenue has already been developed as a wide thoroughfare, and a large amount of traffic from Washington finds its way into Delmar at Union, and also at Kingshighway and then past this crossing.

So, a study of the City Plan Commission's statistics leads to the [fol. 99] belief, and it is founded on fact, that this street is certainly to develop into a much more important thoroughfare than it is now, and that the traffic on it will increase, undoubtedly double, in the next few years, and provision is being made for that increased traffic along this boulevard. It is 100 feet wide at this point, east and west—east as far as Kingshighway.

Q. How are the other streets out there, running east and west?

A. This is the widest, and we look upon this as the most important east and west street in the City from the center portion of the City. We have rather looked upon this place where Delmar crosses the City limits as the western gateway to the City. The increase on Delmar boulevard will be much greater than the normal increase for the reason that we are throwing into it additional traffic.

As president of the Board of Public Service I keep advised as to the trend of traffic and the amount of traffic on different streets, so that I may intelligently advise the Board of Aldermen as to what additional streets require improvements. For that reason we make annual counts, and have for a number of years, to trace the shifting traffic from year to year; and we are able to predict what the traffic will be in the near future. The traffic on Delmar at that place is considered very heavy—all three kinds of traffic, vehicular, pedestrian and street car. I will say that the vehicular and street car traffic at this time is heavier than the pedestrian. The so-called automobile traffic will seek to go through that neighborhood, and will in the

future in increasing amounts. I know that the street car and railroad tracks and the highway are on the same grade.

[fol. 100] Q. Again I ask this question, without asking for a conclusion. Do you, as President of the Board of Public Service, consider that grade crossing on Delmar dangerous?

A. Assuredly so, and we propose or seek to spend public funds in order to help eliminate that danger. I would say virtually the only reason would be to avoid loss of life and loss of time in impeding traffic. The station is on the west side of the Wabash tracks and immediately adjacent to and north of Delmar. Our reports have been that the stopping of trains there necessitates also the stopping of traffic on Delmar. That applies to trains going north as well as south, according to our reports. We have made a very exhaustive study of the separation of these grades in collaboration with the different divisions of the department of the president and engineers of the City government. Mr. Bowen has had charge directly of all structural features of it; Mr. Horner in charge of our sewers and drains; and we have had occasion to draw upon the street department's force for experienced traffic counters, and in every way a careful study of this whole problem was made. We reached the conclusion that the separation of grades was practicable.

Cross-examination by Mr. Brown:

I said the traffic on the streets of St. Louis increased from 20 to 25 per cent a year; that was as to streets in general.

Q. Where does that increase come from?

A. Right here in the building you will find it reflected in the motor licenses issued; this applies to vehicles. Those vehicles are on the streets. This does not include pedestrians or street cars. We [fol. 101] have no count of pedestrian traffic on the streets. On street car traffic, I don't think there has been much increase.

Q. Ordinarily the traffic on the streets would not increase out of proportion to the increase in population?

A. Yes, it has actually done so. We know that to be a fact. The figures I just quoted are the result of our traffic count.

Q. Ordinarily the total traffic would not increase out of proportion to the increase in population of the City? I am speaking now of total traffic, because we have to deal with total traffic on these crossings?

A. It is very fair to assume that the pedestrian traffic increases about the same as the population increases; this vehicular increase is larger and faster than the population increase. That is due largely, I think, to increased use of trucks for moving of freight and merchandise. There is also an increased number of passenger automobiles. That means when you take two passengers off of the street car you put one more automobile on the street, and you would not notice the deduction.

The City Plan Commission has studied the River Des Peres proposition and has made a report of it. We have not made an independent study of this grade separation scheme in connection with the

River Des Peres, but they recognize the fact sooner or later that this grade crossing must be separated. We did not give any special study of the grade separation in connection with the River Des Peres proposition except that those plans were studied and approved. I do not think that approval is contained in any report, but I can [fol. 102] speak knowingly of it, because I sat with the City Plan Commission. The City Plan Commission are all officially appointed as provided for by the City Charter. So far as the City Plan Commission is concerned, they have had no hearing or meeting, no special study of any plan except what I have presented to them.

Q. So far as you know the plan of the Wabash, or any modified plan of the City or the Wabash has never been presented or considered by the City Plan Commission?

A. No, I didn't say that. I have explained them though. They have not made a study of the Wabash plans or any modified plans of the City as far as I know. I appreciate the fact that the traffic that goes west beyond the city limits does not all go through over Delmar. The other principal sources of traffic open there are, the first thoroughfare south, a combination of Lindell and Forsythe; there are two streets that cross between there, but they don't lead to anywhere in particular. They all lead through to Skinker road, but some stop at Skinker road. There is traffic on Lindell drive or west on Waterman, Kingsburg and Washington; there is traffic on all those streets, but the greater volume is on Delmar. In our traffic counts we have not taken into consideration the moving and going west on all of those streets north and south of Delmar. I can produce the figures on Lindell drive. I doubt if we have any on Waterman and Kingsbury.

Q. To the north of Delmar, I think Mr. Bowen stated that Olive street was not open east of the Wabash right of way; it is true that Hodiamont runs north and south along the right of way, and that connects with Olive Street road and that connection has been used for years and years and years?

[fol. 103] A. Oh, yes, but Delmar boulevard leads to the heart of University City, a very rapidly growing community; it is a long, straight thoroughfare, as shown on the map here. Delmar is a broad, straight thoroughfare running right straight west. Traffic desiring to reach Olive street road would come through here and cross that point and go out Olive street road.

Mr. Daues:

Q. All those streets that you show there cross the Wabash tracks on Hodiamont to get to the Olive street road?

A. Oh, yes, it is necessary to cross the Wabash tracks. Olive street road terminates on Hodiamont, east of the Wabash tracks. I understand Olive street road is open across the Wabash tracks; it is a traveled road.

R. C. GANS, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

I am a civil engineer in the City service.

Q. I now hand you City's Exhibit 2, and ask you if under your direction several other men have made a traffic count at Delmar boulevard at point where Wabash tracks cross it, and if so, when?

A. We had this traffic count in October, 1920. The count was divided into three shifts from 7 a. m. to 11 p. m. One man on each shift at that particular point. We also made traffic counts at other points; at all the east and west crossings south of Delmar. These were made in the same manner at the same time and between the same hours, except that we took a one-day's count at the other points, while at Delmar we took six days. They were taken on Monday, October 11th, 1920; Wednesday, October 13; Thursday, October 14th; Friday, October 15th; Saturday, October 16th and Monday, October 18th. Tuesday, October 12th is not there; I don't recall why; it may have been a holiday for these men; there was no reason so far as making a better or poorer showing as to traffic.

Those men were assigned from the street department; they were traffic counters, men that we call each year. Men we used on traffic counts in other parts of the City. They count pedestrians, vehicular traffic divided in classes, one-horse, two or more horses, passengers autos, auto trucks, light and heavy. A separate count for each. Street cars. There was no estimate made of the street car passengers by the counters. They gave the number of street cars and the trains; that was divided east and westbound. They took this count over sixteen-hour periods. I superintended the making of blue print, marked "City's Exhibit 2," which shows those computations. It correctly sets forth the facts as written on those written traffic reports. I examined them to see that they tallied. The count also shows the trains that passed during that period and the time that the crossing was blocked by those trains. Also checked the time the crossing on Delmar was blocked, showing actual number of minutes Delmar boulevard was blocked as a result of those trains being on the crossing. During the sixteen-hour period by three-men shifts the report showed on October 11th, 1920, 556 eastbound pedestrians and 555 westbound. Eastbound one-horse vehicles, 58; westbound, 51; two or more horse vehicles eastbound, 63; westbound, 52; eastbound passenger autos, 2,576; westbound, 2,762. Light auto trucks eastbound, 440; westbound, 424. [fol. 105] Heavy auto trucks, eastbound, 203; westbound, 205. Total for vehicle traffic eastbound, 3,340; westbound, 3,994. Street cars eastbound 654; westbound, 613. Total pedestrians on Monday, October 11th, is 1,111; these were foot passengers over the tracks on Delmar. Total one-horse vehicles, 109; two-horse, 115; passenger autos, 5,338; light auto trucks, 864; heavy auto trucks, 408; total vehicles, 6,834. Total street cars, 1,267. There were 1,267 street cars; trains northbound, 14; southbound, 12; total, 26.

Crossing was blocked 42 minutes during that period. I will produce the original sheets of these men so they may be examined.

Total pedestrians east and westbound on Wednesday, October 13th, 531; on Thursday, the 14th, 833; on Friday, October 15th, 1,099; Saturday, October 16th, 1,213, and on Monday of the next week, 1,039. Total vehicles for Wednesday, October 13th, was 7,297; on Thursday, the 14th, 5,931; on Friday, the 15th, 5,816; on Saturday, the 16th, 6,378, and on Monday of the next week, 5,431. We did not take a Sunday count. That would be much heavier so far as automobile traffic is concerned. I did not think that fair to include that as an average day. The notation on original sheets would show whether it was raining or a clear day. Total trains on Wednesday, October 13, was 26; Thursday, October 14th, 22; Friday, October 15th, 24; Saturday, October 16th, 23; Monday, October 18th, 19.

Q. That difference in the number of trains was accounted for in freight trains, I imagine; the passenger trains are the same each day?

A. I don't know. I presume they are. The gates were down or the crossing blocked 42 minutes on Monday, October 11th; on [fol. 106] Wednesday, October 13th, 42 minutes; Thursday, October 14th, 39 minutes; Friday, October 15th, 32½ minutes; Saturday, October 16th, 37½ minutes; on the 18th, 29½ minutes. These men went out to do this work under my direction. Part of their instructions came from Mr. Bowen because the work was being done for the bridge department. They told us what information he wanted about pedestrians and trains and the time crossings were blocked. Ordinarily we don't take pedestrians or trains in our traffic census. The traffic does not entirely stop in that neighborhood at 11 p. m. The traffic begins earlier than 7 a. m. This does not show the entire traffic at that crossing, but between the usual busy hours of the day. Street car traffic begins before 7 a. m., begins as early as 5 o'clock. It carries the early factory and industrial traffic before that time. Street car traffic going east comes from out in the county as well as in the city; going west from St. Louis to the county. Carries passengers from the county into the city in the morning and carries them back in the evening.

My principal duties with reference to traffic is to supervise the taking of traffic counts and to compile the results. I have given considerable thought to the traffic of St. Louis. Automobile traffic has increased in 1919 and 1920 about 40 per cent—that is, the number of vehicles. It may be a little over 40 per cent.

Q. Would you say that an increased traffic of automobiles means a decrease in vehicular traffic so far as wagons and street cars are concerned, and pedestrians; or is it additional traffic as the result of additional automobiles?

A. Generally speaking, there has been a decrease in horse vehicle traffic, but an increase in pedestrian traffic. We don't ordinarily [fol. 107] take pedestrian traffic counts. The decrease in horse-drawn vehicles is taken up by trucks; and the trucks and horse-

drawn vehicles together now are greater than horse-drawn vehicles heretofore. Those two combined are somewhat in proportion to the increased industrial life. I don't remember the percentage of passenger increase, but it is out of all proportion to increase in population; it overshadows that percentage very much.

In my opinion automobile traffic will continue to increase. Our western traffic and eastern traffic pass the City along the line of the Wabash tracks mostly at Delmar boulevard, which is the principal thoroughfare. Those other streets Mr. Brown inquired about, Olive Street road and the streets south of Delmar are, all confronted with the same situation so far as the Wabash tracks are concerned. There is no way possible for vehicular or other traffic to get away from the Wabash tracks. That includes a long strip of the City's western front.

If elimination of the grade crossing is to be had, it must cross the Wabash tracks somewhere out there. In my judgment and experience as traffic superintendent, the heaviest traffic is on Delmar and will continue to be there. One day counts were made at these other crossings. We had three shifts. I haven't the figures before me.

Q. I now show you City's Exhibit 3. What does your count show there?

A. Eastbound on Waterman avenue, pedestrians, 526; one-horse vehicles, 21; two or more horses, 13; passenger autos, 513. Light auto trucks, 146. Heavy auto trucks, 68; total vehicles, 761. No street cars.

[fol. 108] On Waterman avenue, westbound, pedestrians, 405; eastbound, 526. Total vehicles eastbound, 761; westbound, 775. Count taken Friday, October 29, 1920, between 7 a. m. and 11 p. m.

Lindell avenue, eastbound pedestrians, 34; westbound, 29; total vehicles eastbound, 2,657; total vehicles westbound, 2,751. Check made same day, Friday, October 29.

Next is Union boulevard, northbound pedestrians, 202; southbound, 237; total vehicles northbound, 1,127; southbound, 1,132. This count was taken from 7 a. m. to 11 p. m., Saturday, October 30th.

De Baliviere avenue, northbound pedestrians, 705; southbound, 667; total vehicles northbound, 1,641; total southbound, 1,675. Taken Friday, October 29th.

Hamilton avenue, northbound pedestrians, 1,251; southbound, 1,331; total vehicles northbound, 326; total southbound, 415. Taken Friday, October 29th.

There are other streets, Olive Street road and Delmar boulevard, and there are the trains.

Olive Street road, eastbound pedestrians, 54; westbound, 43; total vehicles eastbound, 312; total westbound, 315.

Obstruction on the crossing at De Baliviere, six minutes delay. Hamilton, two minutes delay. By delay is meant actual time crossing is blocked. Twenty-two trains went by there, and it took only two minutes to go by.

Commissioner Flad: Are there gates on Hamilton avenue?

Mr. Rodehaver: No, a watchman with a stop flag.

Witness: This is the time that crossings were blocked during passing [fol. 109] of trains. Here is one notation: Three passengers at crossing quarter of a minute, east bound, between 7 and 8 a. m. One passenger and one freight at crossing quarter of a minute each, westbound between 7 and 8 a. m. Between 9 and 10 a. m., one passenger and one engine at crossing quarter of a minute each. Between 10 and 11 a. m., eastbound passenger at crossing half a minute, and freight at crossing quarter of a minute. That makes a total of two minutes. It means the trains were over the crossing at those periods.

Mr. BOWEN, recalled:

Q. Mr. Bowen, have you examined the police records of St. Louis as to reported accidents and near accidents at this Delmar crossing?

A. Yes, sir. We have about twenty-five reports of accidents out there that were sufficiently important to get into the police records within the last four or five years. There have been no very serious accidents on Delmar boulevard. There have been quite a number of near accidents. The stage seems to be set for an accident. There have been any number of cases where automobiles have been unable to stop when the gates came down and the train was passing, and they ran through the gates and smashed the gates, and injured the automobile. That is the gist of most of those accident reports.

Commissioner Flad:

Q. I suppose one reason for the small number of accidents there is because there is a good view of the tracks?

A. Yes, and good care is taken; policemen going down to meet trains, same as this officer who testified this morning.
[fol. 110] Q. Give us some of the reports.

A. About 5:20 p. m., August 1st, 1920, while Walter T. Mills, 35 years old, married, native born, in the automobile business, was operating an automobile owned by him west on north side of Delmar, when at intersection of Wabash Railroad crossing located at intersection of Hodiament avenue, his machine collided with the wooden crossing gate, which had been lowered by James Miller, employed as crossing watchman, damaging gate to the extent of \$4. After colliding with gate, Mills turned his automobile to the south and collided with the iron trolley pole in the center of car tracks on Delmar knocking left front wheel off his automobile, damaging it to extent of about \$50. No one injured. Mills was accompanied by his wife and Dr. Frank Hinchy and wife.

There was a train coming, and they let down the gates; Mills stated he was driving at a moderate rate of speed and did not hear the bell.

Here is another report: About 9 o'clock on the morning of April 5th, 1919, while George Mallow was operating his automobile east on south side of Delmar attempted to drive across Wabash tracks;

his automobile was struck by the gate, which was being lowered, damaging gate; no damage to automobile; no one injured. Mallow stated gate was not lowered when he attempted to cross; that he did not hear bell ring. John Cool, watchman at crossing, stated he rang the bell and lowered gate when a switch engine was approaching. Witness to accident stated gate was not down and bell did not ring.

April 16, 1919, Joe Furst reported to Officer James M. O'Neil [fol. 111] that about 3:40 p. m. on 4th inst., while he was operating his automobile west on the north side of Delmar, when at Wabash tracks, Delmar and Hodiadmont, his automobile struck west gate as same was being lowered for approaching train. Watchman at above station stated before he lowered gate he rang bell, indicating there was a train approaching. Mr. Furst stated he did not hear bell. No arrests made.

March 11, 1917, about 12:30 p. m., while Arthur Dorlae, chauffeur, operating an automobile going west on north side of Delmar, when at intersection of Wabash crossing, collided with west crossing gate. Automobile slightly damaged. No one injured. Nothing said about approaching train, but assumption is that when gate is lowered a train is approaching.

April 30, 1917, about 2:45 p. m., westbound Olive-Delmar car 2217, in charge of Motorman Henry Wood and Conductor Andrew J. Prost, when at intersection of Wabash Railroad crossing collided with west gate, breaking off at end. No one injured.

March 24, 1916, about 10:45 p. m., while Harry Newman was operating automobile owned by himself west on north side of Delmar, at intersection of Wabash tracks, attempted to cross while signal gates were being lowered for approaching train; collided with west gate, breaking same. No one injured.

March 31, 1916, about 6:30 p. m., while Henry Diehl was operating automobile owned by Joseph Witek west on north side of Delmar, when at intersection of Wabash tracks he ran through west gate, which was lowered, damaging gate slightly. No one injured. Gateman says he rang bell, but Diehl paid no attention to it. [fol. 112] Diehl said he did not see gate nor hear bell.

(Reports offered in evidence, marked "City's Exhibit 5.")

These records are one for 1912, one for 1914, two for 1915, and the rest for 1916, 1917 and up to last year. We examined no further back. All we found between 1912 and the present is included in what we have here.

Here is a picture; shows Hamilton and Delmar, high-class property; after you pass that there is a stretch of dead land, undeveloped, due to condition of crossing.

(Marked "Exhibit 6.")

City's Exhibit 6 shows balance of Delmar boulevard immediately west of Hamilton.

City's Exhibit 7 shows condition of Delmar boulevard at Wabash crossing, looking northwest in each case. Owners of this vacant property have been coming into the office wanting to know when

something is going to be done with this crossing, saying they are paying taxes on vacant property that they are wanting to improve.

We notice as we approach this crossing the value of property decreases. Take assessed property east, we find the assessed valuation \$123,000.00; taxes are \$2.55 per \$100; owners of that vacant land that can't be developed owing to unsettled condition of the crossing lose in taxes \$3,136.50 per annum. Assuming it to be assessed at two-thirds of its valuation, it is worth \$184,500.00; that property that can't be developed represents to its owner an investment of \$184,500.00, another loss, and at 6 per cent would amount to \$11,070.00 per year. There is another loss to the City owing [fol. 113] to the fact that the property is not developed. It is assumed that improvements would be four times the valuation of the land, then the loss to the City would be \$12,546.00, or a total loss in taxes and interest amounting to \$26,752.50 a year. That is what this idle land is costing.

The total number of street cars passing this crossing as shown by traffic count varied from 1,278 to a minimum of 973; that was for a sixteen-hour period. The average for these six days was 1,100 cars a day. Of course this does not represent all the street cars that pass there. I don't know how much time is lost in slowing down the car and stopping it and having conductor get out and look up and down the crossing; they get to doing it perfunctorily, starting their signal almost before they get off their car.

Great sums of money are being spent in every city to increase the speed of traffic; large sums are being spent in subways to reduce this loss of time.

There are times when that crossing is blocked all the way to Hamilton.

Cross-examination by Mr. Brown:

Q. You spoke of the value of property being depressed around Delmar boulevard; the River Des Peres is just west of that crossing?

A. Yes, sir.

Q. And all of this property that you have referred to is subject to overflow from the river?

A. That depends; there is only one record in the history of St. Louis of property on Delmar overflowing, that was in August, 1915; that extended east of Hodiament about 100 to 150 feet. I can't state exactly how far that did go, but knowing the elevation of the water, 78 feet, four feet higher than the Delmar tracks, about 100 [fol. 114] feet west of Rosedale avenue. I think that property being subject to overflow undoubtedly has an effect on its value. I should think it should have an effect on the inclination of the owner to improve it.

Q. Is there anything unusual or extraordinary about that crossing than at any of the other street crossings in St. Louis about delays?

A. It is the only street crossing on that street that has railroad trains. I don't think there is more delay at Hamilton avenue than

there is at Delmar, but I can't state positively. Sometimes the delay here extends up to Hamilton avenue. I don't know whether they are ever delayed at Grand and Olive three or four minutes or not.

Q. You go to Lindell and Grand, there is greater delay to vehicular traffic than there is at Delmar?

A. Is there? I don't know that that is true.

Q. Isn't it true that at any of these streets that the delay caused by cross-traffic, one stream of traffic crossing the other in the City, in a city like St. Louis, there is necessarily a delay when you change the trend of traffic?

A. There must be; yes, sir. The City recognizes that and at these important crossings station traffic policemen and they regulate the flow of traffic as to direction; they hold up the street cars and vehicles in one way until the street cars and vehicles make the cross-traffic, then change direction and let others go by. I have never taken any count of the delay to traffic on account of delays from that condition; nor have I made any investigation as to number of hours the traffic officers put in at these points.

Q. But even at this crossing there is nothing unusual or extraordinary about that. It is the ordinary condition that exists in the city. You always have that delay?

A. Yes. We would not have this delay here if we had the viaduct over the tracks.

Q. And you would not have it at Grand and Olive if you had a viaduct over Grand. What I want to get at is whether there is anything unusual or extraordinary about this crossing than there is about any other street carrying an equal volume of traffic?

A. But here you have an almost irresistible force crossing north and south over this thoroughfare, and one of these days, if this crossing is not eliminated, you are going to run into a carload of people and cause great loss of life. I don't have the amount of delay at any other crossing. There may have been delays at any of those other crossings. My observations have been that I can go right to Twelfth and Chestnut streets at 5 o'clock this evening and find a great deal of traffic delay. Traffic blocks up four or five blocks.

Q. And if you have driven an automobile you have sat there three or four minutes?

A. I have stood there sometimes. That is the situation you find wherever there is a heavy stream of cross-traffic. I have made no comparative study of accidents at Delmar and accidents at points where the street cars cross each other like Grand and Olive, at Jefferson and Olive or at Vandeventer and Olive. I say that your accidents here have been remarkably few, considering the dangerousness of the crossing; no people having been killed.

Q. We appreciate the fact that so far as accidents go, we have a comparatively clean bill of health; the question of accidents there [fol. 116] is largely one of apprehension?

A. I would not say that I have an apprehension every time I cross the crossing, because I have control of myself when I cross

there. But when I am in a street car, then I am at the mercy of the driver of the car and of his observation. I have been in street cars when the headlight of locomotives didn't seem very far away and the trolley came off, and I would say that that danger is not all one of apprehension.

The large volume of traffic that I have shown as increase is largely due to the automobile.

Q. Is the situation any different on Delmar than it is at any other street crossing where the traffic is comparable in volume?

A. You mean that traffic is increasing here as it is at other streets? Yes, that is true, and the danger increases correspondingly at the other places. I don't suppose the increase is unusual.

Commissioner Bean:

Q. Compared with other steam railroad crossings?

A. I understood him to say there was nothing unusual in that the automobiles have caused traffic to increase all over the City. I assume there is an increase in the traffic throughout the City. As the automobile traffic increases, necessarily the danger increases at other intersections of street crossings; danger to pedestrians and to automobiles and other vehicles.

Commissioner Bean:

Q. Do you know how many grade crossings you have in St. Louis with steam railroads?

A. I think we have forty-five, and I think fifteen of them carry street cars. I could not say positively that the accident records of St. Louis show that there are more accidents at crossings of street [fol. 117] cars with automobiles than from any other sources. I have not studied the records to find that out. Knowing the danger here, I have looked up police reports on this crossing.

Q. It would be true at Grand and Olive; you could find police reports of accidents at that point?

A. I assume it would be at Grand and Olive. I don't know that the volume of traffic is very much heavier at Grand and Olive than it is at Grand and Delmar. I could produce the figures. We don't keep the pedestrian traffic crossing the streets. Of course, there are always dangers of street cars when they cross lines of cars, and there are many other crossings in the City of which Grand and Olive is just an illustration—all the downtown section.

Q. Is it your judgment that merely because the cars on the railroad are operated by steam that there is more danger than if they were operated by electricity?

A. No. They are of much greater weight, greater size and longer, and the impact is infinitely greater than that of a street car or automobile. We have only collected the accident reports at this crossing.

Mr. Senti:

Q. Is there any difference in the manner in which the street cars are operated and the steam railroads are operated, with reference to the frequency with which they stop, that would affect the amount of damage?

A. I think it is common knowledge that the street cars stop at every crossing if necessary to take on or discharge passengers. I don't know whether that would tend to enhance the danger, or what bearing it would have on it, except that the street car could be stopped in very much shorter space than could a railroad train, and the [fol. 118] street car does not travel at as great speed as does the railroad. The street cars stop on the near side. There is no question but that if you had a string of trains in addition to the cars you now have at Grand and Olive, there would be additional menace of a steam railroad crossing there and greater delay.

Q. Would it be as practicable to separate the grades of the streets cars and the vehicles all over town as it would be to separate the grade so far as steam railroads and other traffic is concerned?

A. No, sir.

Q. In your opinion would it be possible to so construct the streets that such places like Grand and Olive, Vandeventer and Olive and Fourth and Chestnut, so the street cars and the automobile would not use the same grade?

A. I think it would be practically impossible to do that. It would at least be a great deal more difficult to bring about a separation of that kind than it would be to simply separate the tracks of the Wabash Railroad Company from the rest of the traffic.

It is proposed to elevate Delmar boulevard with a $2\frac{1}{2}$ per cent slope from a point 235 feet west of Hamilton avenue to a point 230 feet west of Roseale, and to raise up the intersecting streets. That will be about 1,600 feet long. Exhibit 8 shows the profile of Delmar boulevard running about Clara avenue on the east, out to Skinker road on the west. Our grade is now 2.3 per cent running east from De Baliviere, and we propose to introduce a maximum grade at this point of about $2\frac{1}{2}$ per cent. That is a little bit steeper than we have now at De Baliviere. We are adopting a grade that most cities are trying to work to. These plans provide for an 18-foot clearance. Immediately west of the Wabash tracks the River Des Peres [fol. 119] crosses Delmar boulevard, and this shows its approximate present location. It has been confined between the walls of the stone channel 200 feet north of Delmar, and just below that it is joined by a branch which crosses the Wabash farther north. This stream now passes under a bridge on Delmar, and it is thrown against this property and gouges out a large hole there; then it turns over towards the Wabash tracks, and it then turns south in this direction towards Forest Park. Under this plan for the bridge we propose to change the channel of that stream, and extend it in the direction as shown on this plan. That is Exhibit 1. From that point about 100 feet north of Delmar we propose to inclose it in a culvert and then extend it southwardly on Des Peres avenue a distance of about

180 feet south of the south line of Delmar boulevard. That is to be in the estimate of the cost of construction of proposed viaduct on Delmar. It is necessary first, for the purpose of supporting the fill required for raising the street, and, second, for the development of the property at this site. Present cross section is narrow; we propose in this culvert to give it a larger cross section than now exists under Delmar bridge. Ordinarily the stream is dry. The City has a foul water sewer built under the bed of the stream; it runs under the stream. We will bring out later the exact discharge of this stream in times of high flow, including the one of August, 1915.

Immediately west of the Wabash tracks, on this tract on which it is proposed to change the channel of this sewer, there is a large tract of vacant property. In order to reduce as much as possible paying of damages (and the City's experience in such suits for [fol. 120] damages has been rather unfortunate because usually the commissioners will assess the damages), in order to have the right to change the channel and build this culvert, the City has purchased this tract of 280-foot depth running from Rosedale on the west to Wabash tracks on the east, at a cost of \$40,000. This amount is not put in as part of cost of constructing the Delmar bridge. The City will put that in the same as it would any other property it owned in fee.

A. A wall is shown here extending along the west side of Wabash right of way. That is in order to prevent this earth extending over on their right of way and to fill back on this property. By changing this Diver Des Peres to the culvert over here, it will make possible the filling of the property on the south side of Delmar boulevard. These changes are reflected in the net amount of damages for the building and construction of the viaduct.

Delmar boulevard is now paved except from the east line of De Giverville to the west line of Rosedale with wood-block pavement on concrete base. Between these two points the City has constructed driveways paralleling the United Railways tracks, consisting of 12-foot-wide asphalt strips placed on each side of the railway tracks. In preparing the estimated cost of this viaduct we have shown on these plans, and included in our estimate, the paving of this boulevard, from the limits shown for raising Delmar boulevard, to be paved with wood-block paving, with concrete base.

As we understand it, the cost will be divided between the railroad [fol. 121] and the City and other parties in interest, and the proper elements to go into that cost are the cost of reproducing at the new grade, the facilities that existed on the original grade, so that the requirement in here would be to pave Delmar up to the point where it is now paved and to replace these strips of asphalt pavement which the City paved at its own expense. But we figured on the paving of the whole thing, and that will mean that when the damage is paid the commissions will assess as benefits the exact cost of all of this paving where the street is not now paved, so that when the job is done the amount paid will be exactly the same; because if we didn't pave this, we would have to pay the amount it cost in

damages, which would be the same as giving a sum of damages plus the cost of this paving, and we would have to put back these asphalt strips. It is better, therefore, to pave the whole thing and the City gets that back, and our net result will be that the work will be done uniformly, and the cost of work done for cash is done cheaper than on special tax bills. Benefit accruing to the property owners on each side of Delmar would not be equal. Benefit would not accrue to the people over on Hodiament. If Hodiament is to be paved by special tax, it will benefit now; it would reduce the amount of damages. The same is true for Rosedale. We don't propose to pave Rosedale on the north, but we will reproduce the pavement on the south, and we also propose to reproduce De Giverville on the south side of Delmar. Rosedale is not now paved on the north. On the south we simply propose to reproduce the existing pavement.

Rosedale north would have to be paved later at the expense of the [fol. 122] property and the same is true of Hodiament. Just as soon as this improvement would go through, this would be paved under special tax. The reason it is not paved now is on account of the unsettled condition of this crossing.

We have prepared an estimate of cost and we are prepared today to prove that that will be the outside estimate of the cost. However, we are having a local firm of contractors make a separate estimate which will be ready for your meeting on Wednesday. We also employed a real estate expert, who has examined the property and is ready to make his report as to amount of damages and benefits that will accrue to adjacent property by reason of the changing of grade, which amount we will have in the estimated cost.

Mr. Senti:

Q. Do you wish to show these cross-sections?

A. City's Exhibit 9. This shows cross-sections under the bridge at Delmar boulevard. You will note here the cross-section in 489½ square feet and the culvert we propose to construct over here will have a minimum cross-section waterway of 658 square feet; the maximum is 674½.

Commissioner Flad: You have made some effort to determine the volume of water that passed Delmar at that time. Is your proposed conduit large enough to take care of that volume of water?

A. We will show that it is. We are raising that street up not just proposing the construction of the culvert to prevent the flood evil; we propose to change conditions so that the recurrence of the flood of 1915, it will be impossible for the water to get on the Wabash tracks at all. This will be large enough for future extensions. Under the plan for depressing the tracks south of here we [fol. 123] propose to connect up with the present culvert under Kingsbury boulevard. After leaving Kingsbury and Waterman it is open; it does not change present conditions as to danger at those points; it won't make it any worse.

THEODORE HEMMELMANN, JR., being duly sworn, testified as follows:

Direct examination by Mr. Daues:

I have been in the real estate business for many years. I was Assessor and Collector of Water Rates for the City of St. Louis at one time. I have been in real estate business 33 years. I am a very large operator. Our firm name is Hemmelmann-Spaekler Real Estate Company. My experience as a real estate man has not been limited to any particular spot in St. Louis. We have deals all over the City and are familiar with property adjacent to this proposed viaduct on Delmar boulevard. The Comptroller of the City has called upon me to make an investigation as to the damages at this proposed viaduct. I have examined the proposed project as shown on Exhibit 1 and from that have made investigation as to damage resulting to adjacent property.

Q. Tell the Commission what kind of property that is adjacent to this proposed viaduct?

A. That is business property. Stores and flats, retail stores of all kinds with apartments above. I am familiar with the general dip of the ground towards the tracks, and the construction of the bridge is very favorable at that point, for that sort of contemplated [fol. 124] improvement. I have studied this about 12 days. Went out there two or three times a day.

Q. Tell us how the property might be damaged; give the Commission your idea about it.

A. By raising the grade on Delmar up to about 22 feet at the crossing, changing the grade, some of this property will be as much as 21 feet below grade. The corner of Hodiamont and Delmar will be 21 or 22 feet below grade. I have made a study of damages done to Delmar adjacent property and also damage to property on other streets, De Giverville, Rosedale and Hodiamont.

Q. What, in your opinion and judgment would be the consequential damages to real estate as a result of raising the grade of Delmar as proposed by this plan?

A. Eighty-three thousand eight hundred eighty-six dollars and fifty cents. This map contains all the property affected. It would not affect property south to Washington—from Delmar back to the alley and on the north the same way. East of the tracks the property runs to the alley on the north, except here on Enright, they have an incline on the alley. The damage stops where the grade stops, to the alley.

Q. What have you figured as to amount of benefits?

A. Thirty-six thousand seven hundred five dollars and eighty-five cents, leaving \$47,180. The City is benefited to the extent of \$6,000.00 on this piece north of Delmar, and the piece across the creek, \$3,800.00.

Commissioner Flad: What is the basis of damage or benefit to a piece of property?

A. Take this piece at Hodiamont and Delmar, northeast corner. I figure first what it is most valuable for; what would be the natural

[fol. 125] improvement that would go on a piece of property of that kind. In this particular case I figured seven stores on Delmar and four on Hodiament. I figure the necessary cost for extra foundation over and above the ordinary, filling up cellar and back yard. I figure exact cost of construction; if the owner wanted to improve his property, he would have to spend that much money more than if the grade had not been interfered with.

Commissioner Flad: How do you figure the benefit?

A. The improvement in front of this property is \$24 a front foot; he hasn't it now, it is simply a dirt street. If the bridge were there, it would be a street costing \$24 a foot. He does not contribute to the cost, so that would be the benefit he would receive. He is specially taxed for that. I am not limiting prospective benefits by reason of the viaduct, but special benefits that they will actually receive. There would be a special tax for wood block pavements and 8-foot sidewalk, and they must pay for that portion. There is a lot here that could be used for putting up sign boards. He could not build on it at all now, but could if he filled it up. The whole benefit is \$24 per foot.

Mr. Brown: Your prices for construction of extra foundation and filling yards, etc., you have in detail?

A. Yes, sir. I have them so I can tell what they are. I don't know whether you can.

Mr. Brown (to illustrate): On the northeast corner of Delmar and Hodiament you figure on the extra cost of foundation and extra cost of filling the yard. Do you have unit prices there also?

A. Yes, 50 cents a cubic foot for the foundation and \$1.00 a [fol. 126] yard for the fill. I arrived at the quantities by scaling it and figuring it out. I had the blue print and it was just a matter to figure it out. I am quite sure I made no mistake in it. I have quite frequently been called as an expert to determine what damages result from changes of grade. For the last 15 years I have in many cases made estimates of what would be the value of property before and after improvements.

(Hearing adjourned to 10 a. m., February 23rd, 1921.)

Hearing convened as above.

Mr. Daues: The first thing I want to do is to file our answer to the complaint, in which the City joins in the hearing.

(Answer filed as of February 23, 1921.)

(Hearing adjourned until further notice.)

Convened March 23rd, 1921

Commissioner Bean: Are there any appearances to be entered?

Mr. Walsh: On behalf of defendant Rolla Wells we filed answer to first complaint, but have not yet filed answer to the amended complaint. I therefore desire to refile this answer on behalf of the United Railways Company, corporation.

(Which is accordingly done.)

[fol. 127] WILLIAM PANZER, of lawful age, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

I am Chief of the Fire Department in the City of St. Louis, and have been for several years. I am familiar with the location of engine houses in the immediate vicinity of Delmar boulevard where it is crossed by the Wabash tracks.

Q. Tell us where those engine houses are located with reference to that grade crossing on Delmar boulevard and in what cases are they required to cross these tracks, and if they have been delayed by reason of passing or stopping trains?

A. Number 43, located at Kingshighway and Delmar. Two companies in that house. Engine company and truck company. They have occasion to cross that track on all alarms that are on the other side. Number 47 crosses there; that is about fifteen blocks north of that house and about four blocks west. It has occasion to send its apparatus across the tracks at Delmar. Here is another company that crosses the tracks, No. 48. From March 1, 1920, to March 1, 1921, we crossed the tracks of the Wabash Railroad on Delmar avenue, going and coming, ten times. There are no delays reported on that report. Here is one. From October 11, 1920, October 20th, November 12th, January 30th and February 8, 1921, there was one delay there of two minutes, by trains on Wabash tracks. On February 13, 1921, February 18, 1921, two runs, no delays. Engine Company No. 48, these are the alarms from boxes responded to from March 1, 1920, to March 1, 1921; we crossed the tracks of Wabash [fol. 128] Railroad on Delmar avenue, going and coming, eight times with no delays. Engine Company No. 48 on October 11, 1920, October 12, 1920, October 20, 1920, October 13th, 1920, November 12, 1920, January 30th 1921 and February 8, 1921, there was a delay of two minutes. I do not mean a delay of two minutes each, but a delay of two minutes on February 8th. February 13th, 1921, and February 18th, 1921, two runs, same company, no delays. The hook and ladder which is located in the house at Kingshighway and Delmar crossed the tracks thirteen times; we were held up three times. It does not state how long. The district chief of No. 9, who runs out of the same house, crossed and recrossed the Wabash Railroad tracks on Delmar avenue from March 1, 1920, to March 1, 1921, thirty-eight times, two delays by trains, 2 minutes each time, responding to fire. This Company No. 43 passed over the railroad crossing on Delmar going and returning, responding to alarms from box No. 5462, March 6, 1920, March 12, 1920, April 4, 1920, and on November 4, 1921, total of five times no delays. This is a fuel wagon located at the same house. Now No. 10, located on North Kingshighway, crossed Delmar and Wabash tracks twenty-four times, once while responding to an alarm and the other times while hauling ashes and so forth to the dump at Rosedale and Clemens avenue. Delayed four times while hauling ashes by switch engine from April 1, 1920, to March 5, 1921. We have No. 30 engine company,

located about ten blocks west of the 43s. It is east of the tracks. Crossed the Wabash tracks from March 1, 1920, to March 1, 1921, thirty-eight times. Two delays by trains responding to fires, two [fol. 129] minutes each time, and three delays by returning from fires, two minutes each time.

Q. Chief, I will ask you, as Chief of the Fire Department, in your opinion would a delay of one or two minutes in responding to a fire result in serious loss and damage to life and property?

A. Yes. We don't count by minutes in the fire department; we counts seconds.

Q. What would you do if your apparatus was going west on Delmar boulevard and was stopped by a train on the Wabash crossing; would you go around, or would you have to wait?

A. Have to wait. In coming east I would have to wait.

Mr. Hall:

Q. You don't have any fire stations in the City west of the Wabash tracks, do you, Chief Panzer?

A. No, sir.

— You find it more expeditious, do you not, to travel with your fire apparatus over a level street than you do up grade?

A. Why, yes. A grade is not much different with a motor; it is with horses. We still have a number of horse-drawn vehicles.

Mr. BOWEN recalled.

Mr. Daues:

Q. You on the former occasion referred to police reports of accidents at Delmar and Wabash tracks, did you not?

A. I did. Among them were one or two as far back as 1912. We asked the Police Department to furnish us with reports of accidents of the past five years. I don't know how far back the reports went; we examined all the reports they sent us. The request was only for five years; I don't know whether it is complete from 1912 to the [fol. 130] beginning of the five-year period.

We have an exact count from Colonel Perkins as to the actual number of cars passing over the Wabash tracks. I have a letter from him dated February 22, 1921, in which he says that during the month of October, 1920, for twenty-one week days there were 707 westbound cars per day, or a total of 14,847 cars; 746 cars eastbound per day, or a total of 15,656 cars. Five Saturdays, 697 cars westbound per day, or a total of 3,485 cars; 728 cars eastbound per day, or a total of 3,640 cars. Five Sundays, 572 cars westbound per day, total 2,860 cars; 598 cars eastbound per day, total 2,990 cars. Grand total, 43,488 for October, 1920.

This was introduced as Exhibit No. 10.

Q. I now hand you three sets of revised drawings for Delmar and Wabash tracks, and ask you to explain to the Commission what they are.

A. This is a revised set of plans of the proposed viaduct on Delmar boulevard. Since presenting the plans we made a very slight change in plans; it consists in moving the retaining wall on the south side of the bridge and east side of the Wabash right of way to the east abutment of the viaduct, so it will not extend as far as the Wabash right of way as originally shown, and to extend it far enough south to take care of the fill required for raising the property to the east of the Wabash tracks. It also consists in omitting the sidewalk and sod which was shown along the east side of Hodiamont and Enright avenues.

In addition to the three drawings originally submitted, we are now [fol. 131] adding a fourth drawing, which was inadvertently omitted, which shows cross-sections of the proposed culvert within the limits of this proposed work.

We previously introduced a drawing showing the cross-section under present bridge under Delmar boulevard as Exhibit No. 9; it was our intention to make tracing and blue prints so they could be distributed. We have those blue prints at present. In making tracing and blue prints, we made one or two slight corrections which would change one of the sections about two feet from the one originally shown. This is for the present bridge on Delmar.

New drawing offered in evidence in lieu of old Exhibit No. 9.

Witness: I would like to call the attention of the Commission to the clearances from the bottom of the roadway stringers to bottom of truss, and the net area, without making any reduction in the channel; and I want to draw your attention to the middle truss, extending eight feet down below level of the bridge, and the water passing below intersecting this middle truss tends to make the channel at that point a very poor one for the passage of water. I would like in this connection to introduce a picture showing conditions under that bridge and these obstructions (Exhibit 12). There are two middle trusses and two side trusses. With even a moderate flood in the River Des Peres—here is a picture of a very moderate flood which was about seven or eight feet below level of the top of Delmar bridge. You will note from this picture that the middle truss is beginning to accumulate debris (Exhibit No. 13).

This is an exact photograph, taken at the time, August, 1916. In [fol. 132] addition to the bridge offering obstruction for the passage of water, the bridge is at an angle with the stream, so that the water coming down strikes the east abutment and is then deflected to the south and turned by the bank and deflected again to the east. This is shown clearly in this picture (Exhibit No. 14), which is a view looking directly down the channel from the north side of the bridge towards the bridge, and shows the angle that the bridge makes with the channel of the River Des Peres. In 1912 we had a stage of high water in the River Des Peres, causing the water on the north side of the bridge to raise to within six inches of the top of the bridge. The elevation of the bridge is 73.7. The water on the south side at that time, however, only got up to elevation 71, indicating clearly that the height of the water to the north was due to the obstruction of the bridge.

Commission- Flad:

Q. How was it in 1915 flood? Was there much difference between the water on the north and south side?

A. Yes, I think there was five or six inches difference. Prior to 1915 there was an embankment that extended along the River Des Peres, rising from a grade of 74 at Delmar to a grade of 81 about 300 feet south of Delmar, and the flood of 1915 destroyed a portion of that bank.

Here is a picture taken August 21, 1915, the day after the flood, which shows clearly how that portion was taken out of the bank, and also shows the damage done to the Wabash tracks (Exhibit No. 15).

Commissioner Flad:

Q. Was that bank built for protection?

A. No, that was a natural bank. The River Des Peres has moved over and destroyed that bank. The picture marked "Exhibit No. [fol. 133] 16," taken on the same day, looking north towards Delmar boulevard, also shows damage done by the flood at that time.

On August 16, 1916, we wrote to Mr. Cunningham, chief engineer of the Wabash Railroad:

"During the flood of the 20th of last August a bank which separated the Wabash cut immediately south of Delmar boulevard from the River Des Peres was washed out. This is shown very clearly in the accompanying picture. I am sending herewith a print showing the present elevations at this point and the contour line for elevation 71 is drawn in black ink. As the elevation of Delmar boulevard at the bridge over River Des Peres at the Wabash tracks is 73.8, it is apparent that the ditch along the west side of the Wabash tracks will be subject to water from the River Des Peres, should it raise to a height of three feet below the level of Delmar boulevard. As you may deem it advisable to protect your tracks at this point by driving sheeting or otherwise, beg to direct your attention to the present conditions."

Q. That is a carbon copy of the letter that you sent him?

A. That is an exact copy.

Mr. Hall:

Q. Is that a carbon copy?

A. I don't know whether it is a carbon copy of the original, or a copy of the carbon copy. We will submit this drawing as Exhibit No. 20.

Commissioner Flad:

Q. Where is the location of that embankment on this drawing?

A. Right along there, just west of the Wabash tracks. The part that failed is right here, now Exhibit No. 21. So far as we know, nothing was ever done by the Wabash to protect itself

[fol. 134] against the River Des Peres at that point, and since that time the water has gradually eroded that bank wall until—that was taken during the present year (shows Exhibit No. 21). I now wish to introduce Exhibits 17 and 18, which show the present conditions of the River Des Peres at that point. Here are two views, one taken August 21, 1915 (referring to Exhibit 15), the day after the great flood; and this picture, taken March 10, 1921 (referring to Exhibit 17), shows it as it exists today. Exhibit 16 is a view looking north towards Delmar boulevard, shows the condition as it existed on August 21, 1915, and Exhibit 18 shows present conditions looking north from approximately the same point. It shows that the river went nearer the rails and cut the bank. It shows that the Wabash made no effort to protect itself from a flood. There have been two or three records of water going up to elevation 71, which means that they are subject today to ordinary flood stages of the River Des Peres. The records of the flood stages are kept in our Sewer Department, and in our general Wabash plan we show hydrograph plans.

Mr. Rodehaver:

Q. Might that not show that the Wabash have taken the position that no material damage was done to them?

A. It would tend one to believe that. We have no record showing amount of damage done to the Wabash by that flood.

The proposed new culvert under the fill required for raising Delmar boulevard will materially improve conditions in the River Des Peres at that point. When the channel is straightened out, doing away with the unnecessary turns, and by putting in a culvert with increased area. South of Delmar the culvert will not only reduce [fol. 135] the possible height of the River Des Peres, but on sheet four of this Exhibit No. 11 we show that we intend to throw an embankment between the Wabash banks and the River Des Peres, so that after the Delmar bridge is built, assuming that nothing else is done, the Wabash would be protected from flood up to an elevation of 74, or the grade of the tracks on Delmar boulevard. This is shown on sheet 4 of Exhibit 11.

Here are the cross-sections of the River Des Peres south of the culvert, elevation 70, and each of these subdivisions represents one foot, and we throw up an embankment to 74.

Commissioner Flad:

Q. When the river gets above 74, they would be flooded out entirely?

A. Yes, sir. We only have one record of it, that was in 1915. Under conditions existing today, if the water gets up to 71, it will pass down the cut. Under existing conditions after the viaduct is built, and before complete Wabash grade separation is carried out, if the river got above 74 as it did in 1915, it would get on the right of way. It would now get on the right of way where the bank is down. The tracks descend and get lower than the grade of Delmar.

Commissioner Flad:

Q. Where the embankment is washed away?

A. Yes, sir.

Q. That could not occur very readily?

A. It did in 1915.

I want to discuss a little further this particular culvert shown on this drawing. It will extend 100 feet further north than is necessary. This is Exhibit 11. On this plan the culvert is shown to extend 100 feet further north than is absolutely necessary to support the fill. We usually have two kinds of costs; one the cost of construction and the other damage to abutting property; and we have had considerable experience in that kind of work, and have acted as agents for the City in a number of settlements of this kind and in numerous cases. Whenever we can, by increasing the amount of construction, reduce the amount of damage to abutting property by an amount equal to or greater than the cost of additional constructions, we usually resort to that additional construction.

By carrying this culvert far enough north so that this property can be built upon for its entire width, the benefit to the property or reduction of the property damage would be greater than the cost of the additional culvert. The cost figures about \$200 a running foot, so the extra 100 feet is \$20,000. Since then the real estate expert has estimated his damages. The same thing is true of the south side of Delmar.

I have just been referring to land on north and south side of Delmar, on the west side of the tracks.

Commissioner Flad:

Q. And it means an expenditure of \$40,000 for additional safety?

A. Yes, sir.

Commissioner Flad:

Q. From the standpoint of safety alone, would you think that would be necessary?

A. Not on the north of Delmar. But south of Delmar it would not only reduce the amount of damages, it would protect the Wabash as against floods from the River Des Peres.

I now wish to give the City's estimate of the cost of construction of the Delmar Boulevard Viaduct, which is separate and distinct from the general plan, and separate and distinct from damages.

I am reading from Exhibits 22 and 23. Exhibit 22 is the total estimate of the Delmar Viaduct; and Exhibit 23 is the summarized [fol. 137] estimate of the viaduct. Referring now to the detailed estimate, Exhibit 22, we show cost of the main structure on Delmar and the itemized amounts of excavations, embankments, concreting and so forth, is given in this estimate.

The total estimated cost of the main structure is \$214,969. Total cost of retaining wall "A" on west side of Wabash tracks, extending north of Delmar for excavating, concreting, steel reinforcement, embankment and so forth, is \$17,231.

The cost of raising Hodiament avenue is \$13,932. Cost of raising Enright avenue, is \$3,974. Cost of alley in city block 4512 is \$1,856. Raising of De Giverville avenue is \$7,203. Alley in city block 5512 is \$333. Alley in city block 5514 is \$323. Raising of Rosedale avenue is \$7,230.

Constructing the River Des Peres culvert is \$127,403; making total cost of \$424,454, to which we have added the usual amount of 10 per cent for engineering and contingencies, making total cost of construction \$466,900.

In order to prove up this estimate we have first made a summary, Exhibit 23, of all items that go to make up the bridge and approaches.

I also wish to introduce Exhibit 24 (blue print, 3 sheets), which shows the rise in price of sand, gravel and cement, reinforcing steel, rate of wages and price of lumber from July, 1913, to February, 1921.

Across this exhibit we have marked red lines which indicate the dates of taking bids on three pieces of bridge construction work in the City of St. Louis; so that by noting the intersection of the red line with these various curves, the price at that time of the building [fol. 138] material and price of labor can be readily taken on.

From these groups we have prepared a table which we will call Exhibit No. 25, on which costs of items are shown.

Q. What does it show?

A. It lists first the names of those three bridges, the Chouteau Avenue Viaduct, Bellerive Bridge, Southwest Avenue Bridge and the Delmar Bridge.

On this table has been taken off the price of common labor at the time of letting of these three jobs; also the unit prices paid by the City of St. Louis for different classes of work. We always let all of our quantities on unit bases. Excavation by cubic foot, and concreting.

This exhibit shows amounts paid for each of the different jobs, and rates of labor and cost of materials at that time.

To show that these jobs are similar to the Delmar Bridge, we will present pictures to show general character of their construction. Here are two pictures marked "Exhibits 26 and 27," showing the character of construction of the Chouteau Avenue Viaduct, showing solid slab deck and the concrete piers; exactly the same kind of construction as at Delmar.

I now offer Exhibit 28, picture showing the Bellerive Park Bridge. Now, picture marked "Exhibit 29," showing the Southwest Avenue Bridge.

Taking the first item in the summarized estimate, Exhibit 23; and on Exhibit No. 25, the items are marked to the right (in margin). On Exhibit 23, the first item is 53,385 cubic feet of excavation at seven cents per cubic foot.

[fol. 139] By referring to Exhibit 25—I intend to refer constantly from 23 to 25—Exhibit 25 shows price used in our estimate, also price paid for the Chouteau Avenue Viaduct, the Bellerive Bridge and the Southwest Avenue Bridge. On the right of these prices

is shown the ratio we used to the price paid at that time. For instance, the 7 cents per cubic foot is 4.6 of the Chouteau Viaduct, 1.4 of the Bellerive Bridge and 1.06 of the Southwest Avenue Bridge prices. Practically the only thing going into excavation is labor, and the relative rates of labor prevailing at present time is Chouteau avenue, 2.7; Bellerive, 1.8, and Southwest Avenue Bridge, 1.5, showing that as regards the Chouteau Avenue Viaduct we have allowed a higher amount for labor and profit than was paid at that time; showing as regards Bellerive Park Bridge we have allowed a little bit less. The same is true of the Southwest Avenue Bridge.

All excavation at those last two places had to be hauled away, to be moved a considerable distance, while at the Delmar Avenue Bridge it will be unnecessary to move it.

Next item, rock, is handled in similar manner. The ratio to the price paid on the Chouteau Avenue Bridge is 2.94, while price of labor has increased 2.7, showing that we have allowed a greater amount than the increase in price of labor.

The rate of 25 cents per cubic foot for Delmar Bridge compares with the Southwest Avenue Bridge of $16\frac{1}{2}$ cents as $1\frac{1}{2}$ is to 1, while the increase in price of labor is the same.

The third item, rock excavation, is a small item. Item 4, [fol. 140] crete piers to rock, 13,115 cubic feet of concrete. We have allowed 40 cents per cubic foot. When we get to discussing concrete we have to introduce material as well as labor. Taking item 4, we paid $17\frac{1}{4}$ cents for this character of concreting on Chouteau Avenue Viaduct. The price of material used at that time was 9 cents, and that left $8\frac{1}{4}$ cents for labor, plant and profit. We allowed in our estimate 40 cents for same kind of concrete, and as the price of material is 21 cents, it leaves 19 cents for labor, plant and profit, and the ratio of 19 cents to $8\frac{1}{4}$ cents is 2.3, while the increase in price of labor since that time was 2.3.

On the Southwest Avenue Bridge for similar class of concrete we paid $26\frac{1}{2}$ cents. Price of material was 18 cents, leaving $8\frac{1}{2}$ cents for labor, plant and profit. The ratio of the price we used, 40 cents to the $26\frac{1}{2}$ cents, is as 2.2 is to 1. Price of labor is at $1\frac{1}{5}$ is to 1.

I don't think we need go through item by item. You will find that the ratios we have allowed for labor and material are greater than price of labor and material since the dates of the letting of those various contracts.

We have item covering the embankment, 111,070 cubic yards, for which we allowed 70 cents per cubic yard. We have had a contractor make an independent estimate of this viaduct, and he will present that estimate today, and we have instructed him to allow 70 cents per cubic yard for embankment.

In letting our bridge contracts in St. Louis we invariably reserve the filling to be done by the City, and in only one instance have we paid anything, because the giving of free fill usually brought us all [fol. 141] the earth we required. This is particularly true since the rise in price of switching.

On the Southwest Avenue Bridge, located on the Missouri Pacific tracks and Southwest avenue, we received dirt that was hauled from Grand and Lucas and from Thirteenth and St. Ange, distances of several miles, simply because they got free haul and used modern methods of hauling.

Commissioner Flad:

Q. You said free "haul"; you mean free dumping?

A. Yes, sir. In order to get 111,000 cubic yards of earth we have asked the United Railways how much they could furnish. They have frequently handled a hundred thousand yards of earth a year, and I asked the manager for the receiver to make a proposal for the Delmar Bridge, and I have a letter from him in which he says (this dated February 22, 1921):

"In regard to material for approaches to proposed viaduct over the Wabash tracks at Delmar boulevard, I find that during the year 1920 we accumulated waste material as follows: January 1st to March 31st, 246 cars; April 1st to June 30th, 771 cars; July 1st to September 30th, 670 cars; October 1st to December 31st, 577 cars; a total of 2,264 cars; approximately 45,000 cubic yards.

"In order to facilitate your construction work we would be willing to sell to you such portion of our waste material during the coming year as originates at points on our lines convenient to Delmar and De Baliviere, and incident to regular track construction and maintenance work, at 50 cents per cubic yard.

"At this price we would not be willing to undertake any special [fol. 142] track construction to effect delivery, but will shift for a reasonable distance our present tracks on Delmar avenue.

A. T. Perkins, Manager for Receiver."

I will have that marked "Exhibit 30."

The engineers of the company estimate that 30,000 yards of filling material will be available for the Delmar Viaduct.

There are dumps operated in that vicinity today at which they charge 15 cents per cubic yard for dumping. We investigated one of these dumps that accepted dirt that we would not want to use for street filling work, and found it received about 10,000 yards annually.

When we have work of this character we instruct the Building Departments to let us know of any permits for new construction work, and we get in touch with the owners and notify them that they can have a free dump, so we assume that we could get about 20,000 yards of free dirt. We expect to have some 8,000 or 10,000 yards of earth from streets to be graded in the immediate vicinity.

That leaves an item of about 60,000 yards of earth that we would have to bring in, because it would not pay with an improvement costing this amount of money to wait for the accumulation of free dirt.

Dirt would probably cost us a dollar per cubic yard. Along the Terminal Railroad lines there are quite a number of pieces of prop-

erty that are above grade, and it is not a difficult thing to effect a deal with such owner to haul that dirt away.

[fol. 143] As the freight rate on the Terminal is about \$5 a car, and I think the Wabash rate is \$10 a car to this point, that would be about \$15 a car.

Assuming thirty yards per car, \$1 per yard would allow \$15 per car, or 50 cents per yard for unloading and hauling. The average of these different costs is about 70 cents per cubic yard.

Other items in this estimate are brick hand rails, the cost depending largely on the design. The Chouteau Avenue Viaduct was built with ornamental hand rails costing \$3; concrete hand rails, \$4; on the Twelfth Street Viaduct, \$1.50 per running foot.

The item for changes in water mains is \$12,792; that was prepared by the City of St. Louis Water Department. They make their own changes in water mains. We can have the man who prepared that estimate discuss it here.

Item for raising sewer manholes and inlets, \$2,279; that is likewise furnished by the Sewer Department.

All the other items in the estimate are simply the current prices at which paving is being let in the City of St. Louis. Granite curb, \$2.25 per running foot. Wood-block pavements, 75 cents per square foot. For years it was 25 cents per square foot.

Brick pavement, 50 cents per square foot. The price on that was 10 cents. Concrete walks, 30 cents per square foot.

Commissioner Bean:

Q. Doesn't the exhibit speak for itself on those points?

A. Yes, sir. The total cost of the Delmar Avenue Bridge is \$436,900.

[fol. 144] CHARLES W. MARTIN, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

I am secretary of the Woermann Construction Company and have been engaged in the business of construction work about fifteen years. About five years of that was railroad experience, track elevation, bridge construction and construction of stations and round-houses. About four years with the City of St. Louis designing bridges, and the last five years in the contracting business. Have been with the Woermann Construction Company four or five years.

I have made a careful study from my own quantities as to what it would cost to build this Delmar Viaduct. I have prepared an estimate.

(Said estimate is marked "Exhibit No. 31.")

I find that the cost of the Delmar Avenue Viaduct, as shown by the detail plans of the City of St. Louis, is \$420,290. It does not in-

clude changes in the city water main, and I have accepted a figure of 70 cents a cubic yard for embankments. All other prices in the estimate are based, first, on present cost of material; second, on labor data and cost data which has been interpolated up to the present labor rates.

The City supplied us with a statement of their quantities and we estimated all the quantities.

Three hundred eighty-two thousand eighty-three dollars covers the construction and \$38,207 for contractor's overhead, profit and contingencies.

Mr. Hall:

Q. Where is your company located?

A. 1441 Syndicate Trust Building.

[fol. 145] Q. What plans or estimates of the City did you use in making this calculation which you just offered as Exhibit No. 31?

A. Drawings Nos. 1, 2 and 3, dated December, 1920, Exhibit No. 11. I made up my estimate, which is marked "Exhibit No. 31," February 1, 1921. The plans must have been made prior to that date.

Mr. Daues:

Q. You made the estimate in February of the plans that were submitted to you?

A. Yes, sir; I did not make the estimate myself.

Q. Did you hear Mr. Bowen testify that this Exhibit 11 is a plan different from the exhibit that was introduced last February?

A. No, sir.

Q. You don't know, then, that the plan you saw is the same plan that Mr. Bowen produced this morning and testified is different from the plan that he presented on February 21st?

A. No, sir. When you asked me that question, you asked me did I make the estimate. I said no. I made it, but I didn't make every bit of it; my office helped.

Commissioner Flad: Mr. Bowen, do you know whether he estimated on the revised plan or not?

Mr. Bowen: He has.

The Witness: This estimate was made up about three or four weeks ago.

Q. It is dated February 21, 1921.

A. That sheet was written then. That is probably an error, because as I recall now, this wall here and some sewer inlets and man-holes. I had instructions from Mr. Bowen to include in the estimate and I did so and I changed one sheet in this estimate and transferred that quantity over to the total. These sheets were rewritten after I made this date of February 21st. That is the fourth sheet that was rewritten.

[fol. 146] Q. Is that the sheet that begins "raising street sewer manholes and inlets?"

A. Yes, sir. That \$2,122 was added some ten days ago. And the third sheet, Delmar Avenue Bridge, the quantities were changed increasing to include this wall that runs parallel with the track. That sum total was increased a slight amount to include the change in the wall. These two pages are the only ones that have any changes. These changes were carried into the totals.

Commissioner Flad:

Q. You revised your estimates and quantities and retained the same date?

A. Yes, sir.

Mr. Hall: Mr. Burns, representing the Chicago, Rock Island & Pacific, is here now.

Commissioner Bean: Let the record show that.

Mr. Luther F. Burns:

Q. You said something about basing those rates on estimates of the past five years?

A. Our labor experience.

Q. There have been wide fluctuations?

A. Yes, but the variation of work done per man-hour has not been very much. We employ all the way from 30 to 300 or 400 men. We work in the vicinity of St. Louis. I based this estimate of \$420,000 on present market prices as of the day I made that up. I might say that in the back of this estimate I have a schedule of unit prices which we used in the estimate. In this estimate of unit prices we have the quotations we received from material companies.

When we received that list of city quantities we estimated every inch in there, and if there was a variance of 2 or 3 per cent between our quantity and that of the City, we rechecked the figures to determine which was right.

[fol. 147] THEODORE HEMMELMAN, recalled.

Q. What change do you want to make in your testimony?

A. At the last report I didn't have all the property included in the damages. There was some property owned by the City and I got the idea that that was not to be figured on, and after I made my report they called my attention to it. The damages as I estimated them are \$103,712.50, and the benefits \$41,955.71.

Q. Have you viewed the property again, having in mind the extension of this culvert 100 feet as the plans show?

A. Yes, sir. I would make the Delmar front of this property, which is 400 feet, valuable for business purposes; the other way it would make a good part of it not valuable.

Q. In your judgment, does the extending of this culvert reduce the damages in this neighborhood?

A. Yes, sir.

Mr. Hall:

Q. You say that the extension of the culvert north and south of Delmar avenue would make a greater frontage on Delmar available for building purposes; is that correct?

A. Yes, sir.

Q. That is to say, a wider extent east and west on Delmar or a greater depth north and south?

A. Both. Greater depth and more frontage. You could build on it with the sewer taken further away from it, from the front of it, further north. There would be less danger of flooding the property.

Commissioner Flad:

Q. You have to have some cover for the sewer?

A. Yes, if you didn't have the sewer covered, you would have to have an embankment.

[fol. 148] Q. Did you have any estimate of the costs of building adjacent to Delmar made as a basis for your estimates?

A. The City furnished me with the cost of removing and raising buildings on Delmar avenue, west of the Wabash tracks. There are four buildings, I think; they gave me figures on that. My estimates are based on estimates furnished by the City on those four houses as far as improvements go.

I believe the top of that sewer is about fifteen feet below the surface of the bridge.

Q. What was your basis for those estimates with reference to the character of the fill or the embankment in Delmar boulevard. Did you estimate the embankment would be perpendicular and come only to the property line?

A. No, the City is going to put a slope in there, but I didn't figure it so accurately to find the exact number of cubic feet that would go into that slope.

Q. Did you figure it on the basis of all that property adjacent to Delmar being immediately built upon the new level of Delmar?

A. Not immediately. I expect in time it will be built on the new level of the bridge, my estimate was made on that basis.

The City furnished me with the cost of removing or raising buildings on Delmar west of the Wabash tracks. There are four buildings, think they gave me figures on. My estimates are based on estimates furnished by the City on those four houses as far as improvements go. I know those buildings as they stand there now on the south side of Delmar west of the tracks would be practically rendered valueless by this change in grade, so far as the improvements are concerned. I took into consideration the effect upon [fol. 149] property abutting on the alley east of Hodiarnont and

south of Enright and north of Delmar. The corner of the alley on the north side of the alley is raised 11 feet 2 inches and at a point 68 feet east of that, 7 feet 7 inches; point 50 feet east of that, 5 feet; point 50 feet east of that, 3 feet 3 inches, and 50 feet east of that, 7 inches; and 40 feet east of that is grade.

The block at the corner of Hodiamont and Enright being restricted to residence only, I put the damage at \$2,500.00. The property is vacant. That has a front of 166 feet 5 inches on Enright, 68 feet $3\frac{1}{4}$ -inch on the alley, and 202 feet $8\frac{3}{4}$ inches on Hodiamont. That is on an angle. That lot is restricted to residence only. That lot as it now stands is worth about \$4,500.00. I averaged the frontage on the alley and on Enright.

The property of Hugo A. Koehler fronting 172 feet 7 inches on the north line of Delmar, fronting 259 feet $10\frac{1}{4}$ inches on the alley, fronting on the east line of Hodiamont 180 feet $5\frac{1}{8}$ -inch. I estimated the damage at \$16,577.00. I estimated the value of the inside 100 feet at \$150 a foot and the corner at \$200 a foot--about 115 feet of the corner. I did not figure that on the Delmar frontage, on the average, the total value being \$38,000.

Property owned by Frank Cummins, 119 feet 6 inches on the south side of Delmar, damage \$4,746.00. I figure the value at present time at \$10,500. There is another property there, John J. Kelly, 25 feet by 135 feet, damage to that is \$1,095.00. I figure the present value of that property at \$3,750.00.

Next is Edward S. Hart, 50 feet on the south line of Delmar, damage to that \$1,457.50; present value, \$150.00 per foot. The [fol. 150] next piece is property of the Pierce Oil Corporation, which has 50 feet front on south line of Delmar and 70 feet 2 inches on the alley; damage, \$4,751.50. That corner is worth \$200.00 a foot, frontage 60 feet; that is an averaged frontage. That damage includes damage to the filling station, which is ruined by changing of grade.

Across the street is property of O'Neil Ryan; 57 feet 6 inches on south line of Delmar by 33 feet 9 inches on the alley; damage, \$2,145.00. Present value, \$225.00 per foot for averaged frontage of 45 feet.

Next is property of Joseph Marre, 100 feet on south line of Delmar by depth of 135 feet to the alley; damage, \$800.00. That property is worth \$200.00 a foot. Straight frontage of 100 feet.

Next is Henry Boardman, 50 feet on south line of Delmar by 135 feet; no damages.

Next, John Haggenjos, 25 feet adjoining this on the east; no damages.

And Frank Haggenjos, 100 feet on south line of Delmar; no damages. The O'Neil Ryan and Pierce Oil Corporation are the only properties that are now improved. There is an oil station on the north side also. I figured \$1,000.00 as the damage to oil station on the north side of that lot. It practically destroys the station; that is, the value of replacing station somewhere else. That is the only estimate I took; if he went somewhere else, he could build another station like that for \$1,000.00.

Q. You did not take into consideration, then, that his filling station was located on the most widely traveled thoroughfare according to the City's authorities?

A. No, sir.

[fol. 151] Q. You think that would make no difference in the location of a filling station?

A. It depends on how much business he does. I was never called upon to take that into consideration. The same is true as to estimate of damage on the south side of Delmar.

I have given all of the estimate of damages on the south side of Delmar and east of the tracks. I have not given all the estimates of damage on the north side of Delmar and east of the tracks. Those estimates are:

John J. Kelly, 100 feet on the north line of Delmar; value, \$175.00 per foot; damage, \$5,806.00.

Fred Schmidt Realty and Investment Company have 50 feet on north side of Delmar; value, \$200.00 a foot; damages, \$4,757.00.

Alfred Cohn, 50 feet on north line of Delmar; damages, \$1,215.00.

Joseph A. Marre, 100 feet on north line of Delmar; value, \$225.00 a foot; damage, \$800.00.

Filemena Giuseffi, 50 feet on the north line of Delmar; value, \$250.00 a foot; no damages.

Girolami D. Giuseffi, 150 feet on the north line of Delmar; value, \$250.00 a foot; no damages. This piece, the eastern 60 feet, is just at grade, and the west end of the lot is 4 feet 2 inches below grade. That is an open airdome. I figure no damages. I figure we would raise the west end of the lot four feet; the lot back of the sidewalk is above grade now. That is the proper angle for openair house to get the proper slope. The slope is from Delmar north, that is the way they want it; this change in grade would make the slope from west to east; four feet higher on the west than on the east side. I figure no damage there. A little back of the line that [fol. 152] lot is now about four or five feet above grade.

I figure \$800.00 damages to the Marre 100 feet on the south side of Delmar. No damages on the Boardman piece adjoining.

Commissioner Flad:

Q. There seems to be quite an embankment there. What is the embankment there?

A. It is above grade east end; the west end of the lot is 5 feet 6 inches below. I don't think there is any damage.

Q. On the south side of Delmar, west of the tracks, where do you commence to estimate damages and benefits?

A. Right at River Des Peres; the River Des Peres bed runs through this lot. The new sewer will be under River Des Peres avenue, but the present River Des Peres runs right through this 221 feet. The lot between the tracks and Des Peres avenue, 60 feet 3 inches, belongs to the City of St. Louis; that is on the south side of Delmar. I figure the damages at \$4,941.00. I didn't figure present value, just figured the amount of filling necessary to bring it to grade.

Going west, the next lot is Hugues Brussell and Pretoria Realty Company, 193 feet fronting on Delmar, which is cut up by the sewer, open waterway. That is benefited. This lot, 193-foot front, in my judgment, is worth for advertising purposes about thirty dollars a foot, and is unfit to build on, except the extreme west end. After the bridge is built, without considering the cost of the street which it would have to pay, I think the ground is worth \$50.00 a foot. That is the ground east of the buildings and west of the tracks on the south of Delmar. The creek runs through it.

[fol. 153] The next property is the one which has improvements. There are 110 feet on Delmar covered with building 110 feet front by about thirty feet deep. I think there are six stores on there; it is a two-story building, fairly well constructed.

I estimated the damage at what it would cost to raise the building and change the different floors and front to conform to new grade. The estimate furnished by the department is \$16,000.00, and \$1,000.00 to fill the lot in back, making a total of \$17,000.00. That is the City's estimate.

Q. You are giving this Commission your judgment as to the amount of damages and benefits. Have you undertaken to make any independent investigation to find whether your estimate is correct, or have you relied on the City's estimate?

A. I have relied on the cost given by the City for these four pieces of property; I have no way of estimating that because I have no such kind of work.

I have prepared a formal report which has been offered as Exhibit 32.

Q. On the north side of Delmar, west of the tracks; those estimates are the ones you have revised since you testified before?

A. Yes. Here is a piece of property belonging to the City, I valued because of the peculiar shape it is in, creek running through it. It is 400 feet on the north line of Delmar, bounded east by the Wabash right of way, west by Rosedale avenue, by a depth of 280 feet northwardly. I valued that total property at \$40,630. After they changed the channel of the creek, I valued the remaining property at \$28,476, the difference being the damage as to that tract.

[fol. 154] Property belonging to John Coultras, 396 feet on the north line of Delmar, west of Rosedale. Damage there, \$6,600 for raising building.

That was furnished by the City Engineer's office. I did not estimate present value of the property, simply figured cost of raising building to the new grade.

There is no other property on the north side of Delmar.

I did not give you all the property on the south side of Delmar. The southeast corner of Delmar and Rosedale belongs to Carl G. Stifel, 65 feet 5 inches; the damage to that is \$6,517.50.

THEODORE HEMMELMANN, JR., recalled.

Mr. Hall:

Q. Now, Mr. Hemmelmann will you tell us what damages you estimated for that property at the southwest corner Delmar and Rosedale?

A. Property of Bernaro at the southwest corner of Delmar and Rosedale, having a front of 42 feet 9 inches by a depth of 114 feet 6 inches, total damages there is \$6,028. This is for the raising of the building and filling in the yard.

Q. That is on the same basis as the other buildings?

A. Yes, sir; in that instance I also took the estimate of the City Engineering Department.

Q. What about the property west of that, of Emma Lowenstein?

A. There is no damage there. That property west of it is all above grade now and will be about the grade of the bridge when completed. There is no apartment house west of that Lowenstein tract on the south side of Delmar.

[fol. 155] Q. I have a very distinct recollection that there is an apartment house there called "Albert Hall" within 150 feet west of the southwest corner, and is up on an elevation of about 4½ feet.

A. There would be no damages there because the bridge comes about that grade. I think, Mr. Hall, you will find that apartment beyond the west approach of the bridge; I have not looked into anything beyond that.

Q. Well, that apartment house there is about 4½ feet above the present level?

A. Yes, sir.

Q. You estimate that there would be no damage to this property fronting on the new grade because it would be at about the grade of the new street, and that estimate would be based on the assumption that the people would be compelled to build on the new grade regardless of whether they wanted an apartment house elevated above the street?

A. They could do that; the average apartment house is only built about 3 feet below the ground. That ground there is all about 4 or 5 feet above grade. The west line of Bernaro property is 5 feet 2, the next lot is 3 feet 5 inches, next is 2 feet 5 inches, and the next 30 feet is a foot and three-quarters inch. The grade in front of Bernaro's property will be 6 feet above. I do know these buildings can be raised; I have done work of that kind. I knew some buildings cannot be raised, but I know this building can be raised. That is a two-story brick building. There is one store fronting on Delmar. There is a saloon on the corner; there is a double store in the rear fronting on Rosedale. It is one store—looks like two.

Q. There is a shoe shop there, and a tailor?

[fol. 156] A. Yes, sir; that is right. I do not estimate any damages to the owners of that property—I mean the business in that property. I estimated damage to the two stores fronting on Rosedale—to the buildings.

Q. That is included in the estimate furnished by the City?

A. No; they didn't give me an estimate on that. I allowed for raising the rear building \$1,328.

Q. How far would that grade extend south in Rosedale avenue?

A. At the corner of the Benaro property, at the alley, the grade is 2 feet, across the alley 1 foot 5 inches, then about 40 feet south of the alley it comes on grade.

The southeast corner of Rosedale and Delmar—property of Carl G. Stifel, estimated damage, \$6,517.50. On basis of raising the building. The damage to vacant space of 40 feet 5 inches on the south side of Delmar is included in this estimate; that is all one piece of property.

Q. What is the total amount of damages that you have found all the way through on Delmar, raising to new grade?

A. I haven't figured that separately. I have it here of the whole business. I could figure it for you in a few minutes.

Q. Does that include anything south of Delmar?

A. Yes, clean down to Forest Park.

Q. You also spoke of benefits.

A. That is where there is no improved street now. Part of the street is not made, just macadam, and when the bridge is completed they would have a made street and sidewalk, and I figure that would be a benefit to the property.

Q. How have you taken that into your calculations?

A. By figures given me by the City of \$24 a running foot.
[fol. 157] Q. Have you said, for instance, that this property of Carl G. Stifel, at the southeast corner of Rosedale and Delmar, was damaged \$6,500 and then deducted the benefits?

A. Not in that particular case. The street is made in front of the Stifel property. Taking it where it is not made, I estimated it as benefit at the rate of \$24 a foot. Where I have given the damages to a particular piece of land, the benefits would come out of that damage. I think there was only one case—where the creek runs through the middle of the lot—where there is a real benefit to the lot.

Q. How do you figure that the benefit is to be paid, by the Wabash or the City?

A. I did not think it was for me to determine who was to pay it. I understood it could be made a special tax against the property. In my estimate of damages I have not taken into account in any way the effect upon any business.

Q. If a man had a place of business there which would be practically closed up for two years while that improvement was being put in there, by reason of the fact he had no—

Objected to as being a legal question; objection overruled.

Q. Taking the Koehler property, northeast corner of Hodiamont and Delmar; the elevation of the grade there would be practically twenty feet?

A. Twenty feet five inches; that would be saying that along the building line there would be a fill of loose earth of more than twenty feet. They build a foundation and fill around it. You could build a 20-foot high rock foundation. I would build before I would fill.

Q You are figuring, then, that the building must be put up by these property owners in order to come within the damages; that the [fol. 158] building must be put up before the grade is complete?

A. No, I don't think so. I think each property owner will take his damages and put it in his pocket and keep it there until he is ready to build.

Q. You have arrived at your estimate of damage on the theory that the lots would be occupied by certain buildings such as you described and that it would cost as much more to erect those buildings with the grade elevated as you have stated the damage to that property?

A. Yes, sir.

Mr. BOWEN recalled:

Mr. Daues:

Q. What do you say about the total cost as estimated for the Delmar grade crossing?

A. I understood Mr. Hemmelmann to say he estimated the gross damages on Delmar at \$103,712.50; total amount of benefits would be \$11,955.71. That would make the net damages \$61,756.79. That added to the City's estimate of cost of construction would make total cost of Delmar Viaduct \$528,656.79.

I understood Mr. Martin of the Woerman Construction Company to testify his estimate of cost of construction was \$129,200. He said that was without estimated cost of water mains, which is \$12,792; after adding that, we have his estimate of cost as \$133,080. If to that we add 10 per cent for engineering and contingencies, we have \$176,390.20. Adding to that net amount of damages, we have \$538,116.99; a difference of about \$10,000 in totals arrived at in excess of the City's estimate.

[fol. 159] Q. Now, Mr. Bowen, we promised the Commission, while it really was not part of this case, that we would indicate conclusively how the separation of grade at Delmar, if effected according to your plans, would affect the grades between Delmar and Forest Park. Will you show how the plan can be worked out?

A. Yes, I will now offer and testify from the City's Exhibit 33, which consists of a complete set of Wabash grade separation plans, containing thirty-three sheets.

The first drawing shows the proposed change in grade of Wabash tracks beginning at Kingshighway on the east side of Forest Park and extending to Etzel avenue in St. Louis County.

Generally speaking, it provides for elevating the Wabash tracks north of Delmar and depressing them south of Delmar. We will begin at Kingshighway, at the east end of Forest Park.

The City's plan in Forest Park consists first in slightly changing the alignment of the Wabash Railway, moving the line about fifty feet south until it gets to Union boulevard, where the alignment is changed so as to strike the intersection of Union and Lindell boulevard, moving it on property owned by the City in Forest Park.

Drawing No. 2 shows the new proposed alignment of the Wabash tracks, also present and proposed grades. The present tracks on this drawing are shown in red; the proposed tracks in yellow. That is between Kingshighway and Union boulevard. East of Kingshighway the Wabash tracks run in a cut varying from 21 to 23 feet in depth and they approach Kingshighway on a descending grade of .84 per cent. After passing Kingshighway, they rise and run along [fol. 160] present grade on ground for 1,600 feet; then for 1,900 feet they rise on an embankment, then descend on a grade of 1.1 per cent to Union boulevard.

The proposed grade set out provides for depressing Wabash tracks so that when they reach the intersection of Lindell and Union, they would be 13 feet below present grade of tracks on Union boulevard.

To show in detail just what effect that will have in Forest Park, we show here (Exhibit 34) the present condition of Forest Park. This is drawn at 50 feet to the inch scale. Coming out from under the bridge at Kingshighway the Wabash runs in a cut for 300 or 400 feet and near Kingshighway it is 20 feet deep and varies as it makes its passage through the park; then it raises up and passes over present Grand drive, then descends to intersection of Lindell and Union.

This portion of the track from Grand drive to Kingshighway for a long time has prevented the bringing in of any streets from the east. It was our plan to bring in Forest Park boulevard, but the Wabash tracks were too high to get over without unsightly crossings, and too low to get under.

Notice on Exhibit 35, 400 feet west of Grand drive, the present level of the ground comes up to the level of the Wabash tracks. If these tracks are depressed, this leaves the curve of Grand drive on the level of this high ground. That is shown on this drawing, Exhibit 35, showing proposed condition in Forest Park after grade is changed.

The proposed grade where they cross Grand drive is 2 feet 9 inches higher than the present level of Grand drive under Wabash tracks. Where the tracks cross Lindell and Union boulevard, they [fol. 161] are 5 feet lower than present grade of Grand drive where it passes under Wabash bridge, and 13 feet lower than the intersection of present grade at Lindell and Union.

Commissioner Flad:

Q. Does that change the grade at Union and Lindell?

A. Raised about seven and one-half feet at that intersection.

I want to draw your attention to the reason for changing the alignment of the tracks and what we propose to place on either side of the Wabash tracks. That is shown in detail on this cross-section of Exhibit 33. I can draw rough sketch here (witness makes improvised sketch on sheet of paper, marked "Exhibit 36"). Here is where the Wabash track runs through Forest Park on an embankment. If in depressing this track we made our depression immediately under the embankment, we would not have any place to put this track without moving it. This change in alignment gives us a

method of handling the work during the construction period; also gives us a place to put the earth we get from this excavation.

The railroad will be uniform in depression from Kingshighway to Union, with an embankment on each side with uniform height of 12 feet above the rails. That will make it impossible for any rise of water that we have from getting into the Wabash cut, and make possible a uniform treatment of the railroad throughout Forest Park from a landscape point of view. It would also serve to keep pedestrians from getting onto the railroad tracks. We show on our plan to carry this footbridge here across the tracks. That will be included in the estimate; there will be no grade crossing over this [fol. 162] track, and the depression of the Wabash tracks will tend to discourage pedestrians from crossing the tracks.

During the great flood of August, 1915, the height of the water at Lafayette Bridge, shown on Exhibit 35, was 54 feet 9 inches. The present level of the ground at this point is 62 feet 5 inches. The present level on Grand drive was 54 feet 5 inches; so that, from any point of view, even with a repetition of the flood of August, 1915, it would be impossible for the water to get into this cut.

This drawing (Exhibit 37) of the bridge at Lindell and Union was worked out by the St. Louis Chapter of the American Institute of Architects in competition. It has been included in the estimate of costs. All our bridges in this plan have been estimated for a four-track scheme, although at none of the crossings does the Wabash have more than two tracks. The width of Lindell and Union and the span required for the track has determined the size of the bridge. This circle is 200 feet in diameter; it is generally agreed that the size of that circle is too small for the accommodation of traffic at that intersection. If this plan was actually carried out, the City would at its own expense pay to make a larger circle.

This drawing that I now refer to, drawing 2 of the general Wabash plans, also shows the drains that will be placed under the Wabash tracks to carry off the rainwater.

This drawing also shows size of the main drain to be laid to carry off rain that falls in right of way.

For the first 1,200 feet west of Kingshighway it will be drained [fol. 163] by 15-inch pipes, which run into a sewer which crosses under the Wabash tracks and empties into the River Des Peres. At this particular point the height of the track is a little more than 10 feet higher than the highest flood stage in the River Des Peres. West of that point a new line of drains is introduced running to the west, and crosses Lindell and Union, and is picked up by a 30-inch sewer and runs on westward.

Drawing No. 13 of the general set of plans shows the proposed cross-sections of the Wabash at different points. The first cross-section is marked "Typical half-sections through Forest Park."

This left-hand half-section shows half for a two-track layout; the other half for a four-track layout, which is not considered in Scheme 5-A. This is just to show how it would be widened to a four-track layout without changing the walls.

Mr. Hall:

Q. That would necessitate the construction of retaining wall on one side?

A. On both sides.

The proposed grades on Lindell and on Union boulevard are shown on sheet No. 19 of Exhibit 33. The upper profile shows the grade on Lindell. The plan was to raise 2 per cent running both east and west from Union Boulevard. The points where these grades would run out is shown on drawing No. 18 of the general set.

The section between Union and De Baliviere: The change in alignment of the tracks in Forest Park bringing us up to Lindell and Union would cause a slight change in alignment until the tracks could be brought to present right of way. This will necessitate the purchase of some additional land at Lindell and Union, the [fol. 164] area of which is shown on Exhibit 38. It will require the purchase of a parcel of land shown here in two strips, one containing 24,320 square feet and the other containing 13,885 square feet of land. These strips would have a frontage along Lindell of 173 feet and on Union of 55 feet 10¾ inches.

A little over half of the land to be purchased is shown in yellow and the balance in red on drawing. Between De Baliviere and Union the tracks must be depressed. The lowest part in the track is at Lindell and Union boulevard, where the proposed elevation is 49.3 feet, and at De Baliviere the proposed elevation is 49.65 feet. The proposed grade is almost perfectly flat.

This depression at Lindell and Union is thirteen feet, but the grade at De Baliviere is higher, about five and one-half feet, so the depression at De Baliviere would be about eighteen and one-half feet below present grade of De Baliviere. De Baliviere will be raised about two and one-half feet. Union about seven feet.

Between Lindell and Union and De Baliviere the drainage system is a sewer which varies in diameter from thirty inches at Lindell and Union to thirty-six inches at De Baliviere. From that point, assuming the work is to go ahead before the River des Peres sewer is completed, it will be drained by a sewer running across Forest Park to the River des Peres at Tamm avenue.

The City's reason for not pressing the entire scheme at the time is because it has not as yet built the River des Peres sewer.

If this work is carried out it will be necessary to construct a sewer [fol. 165] from De Baliviere to River des Peres at Tamm avenue. The grade of water at River des Peres and Tamm avenue in 1915 is such that proper grades could be had for this sewer. The profile of that sewer is shown on sheet No. 29 of Exhibit No. 33.

Commissioner Bean:

Q. What would be the length of that sewer?

A. Ten thousand 800 feet. Most of that would be in rock-cut tunnel under Forest Park. The elevation of the flow line of the sewer under Wabash track would be elevation of 39.8, or about 20

(should be 10) feet lower than proposed grade of track at that point.

Commissioner Flad: I understand this sewer will only be necessary to build in event this construction goes on before the construction of the River des Peres is completed?

A. Yes, sir. The elevation of the high water at Tamm avenue in 1915 was 39.3 feet. The elevation of the proposed tunnel is 49.6 feet (should be 16.32 feet). The size of that sewer is 42 inches in diameter.

In connection with the discussion of this culvert it might be well to draw your attention to the hydraulic grade of the River des Peres as shown on sheet 33 of Exhibit 33. The lower line shows the bottom of the River des Peres and the stations are given from the Mississippi.

The extreme station on the right is Delmar boulevard. From this station you will note the grade of the water in 1915 at Tamm avenue, where it is proposed to bring out that sewer.

Lafayette Bridge is represented by this line and the grade in 1915 was 54.9 feet; the previous record at that point was 50.6; there have [fol. 166] been three floods that got as high as 50 feet. This record is given since 1897. The hydrograph shows that the flood of 1915 greatly exceeded anything else.

In determining amount of work that goes into the new drawings of proposed work we have always endeavored to reproduce existing conditions.

Between Lindell and De Baliviere the Wabash has three tracks, two main line tracks and one storage track. This storage track during the last two or three years, when there was quite a bit of building along Pershing between De Baliviere and Union, has been used as a team track for bringing material to those buildings.

In our estimate we have figured on reproducing three tracks; at Lindell and Union we reproduce this in the deepest and most expensive part of our work. In actual construction I think it probably would be fair to reproduce that track some place where it would cost less money.

On this drawing No. 3 of Exhibit 33 we show in dotted line the proposed location of temporary track to be used during the course of construction. During the course of construction it is proposed to swing the northernmost track of the Wabash far enough to be out of the limits of the excavation and run single track to Delmar until both tracks can be put into the cut.

There is a vacant alley almost the entire length required, so it will not be necessary to encroach upon private land except for about 100 feet between De Baliviere and the western limits of this alley. West of De Baliviere an alley is available all the way to Delmar boulevard.

[fol. 167] The alley adjoins the Rock Island between Union and De Baliviere and extends from the garage to De Baliviere. Between the garage and the property north of it. The alley at that point is thirty feet wide and west of that it is twenty feet. It is proposed to place this track five feet north of the south line of the alley.

We now show you the section between De Baliviere and Delmar boulevard, being sheet No. 4 of general set of drawings, Exhibit 33.

Rising from the grade shown here at De Baliviere the grade will rise to present grade of Delmar. The maximum grade on this line shown anywhere is 8/10 of 1 per cent. Where this proposed line crosses Waterman avenue, it would be about fourteen feet below present grade of the tracks. Where the proposed line crosses Hamilton avenue, it would be about six feet below present grade of tracks, and tracks now run in a cut between De Baliviere and Delmar.

Between De Baliviere and Delmar the width of the Wabash right of way is 56 feet. When this territory known as Washington Heights was laid out, strips 22 feet wide were laid out and left unimproved on each side of the Wabash right of way to De Baliviere.

In order to provide land for the side slopes required for depressing the tracks, the City of St. Louis purchased those side strips from the Nina Realty Company, for about \$24,000 or \$25,000. That includes the wide strips shown bordering on Delmar. In our estimate of cost we proposed to place this property as part of the cost, at the amount of money paid for it by the City of St. Louis.

[fol. 168] Going back to page 3, is shown a small triangle of land lying right between the tracks of the United Railways and the right of way of the Rock Island and the Wabash right of way, a triangle strip of land which it will be necessary to purchase to carry out this project.

Also north of the 22-foot strip purchased by the City and running into De Baliviere is an alley 15 feet wide. It would be necessary in depressing the tracks at this point either to construct an expensive wall or acquire the alley. It would be the City's policy to vacate the alley, and use part of the property as part of the necessary right of way for the car-ying out of this project.

Referring again to sheet 4 of general set of plans, Exhibit 33, shows sewer line to extend under Wabash tracks to drain right of way. They extend from a point about seven hundred feet north of Delmar down to De Baliviere.

It is proposed to elevate the tracks north of Delmar passing over Olive street road in the City of St. Louis and passing over Maple avenue, which is in St. Louis County.

Commissioner Bean :

Q. Have the railroad tracks pass above the street there?

A. Yes, above the street. We have no immediate interest in the method of grade separation north of the city limits; in order to complete the plan and get back to grade, we come back to it as rapidly as we can with an 8/10's of 1 per cent grade. But we think the Wabash should elevate its tracks to and across Page boulevard. Page avenue is 5,000 feet north of Delmar boulevard.

[fol. 169] Drawing No. 7 of the general set of plans shows the proposed track layout north of Delmar and the method of taking care of the industries, shows all of the industry plants.

The City of St. Louis has now under condemnation proceedings land between Skinker road and Hodiament avenue for the opening of Skinker road to Olive street road at its intersection with Wabash tracks. It is expected that this street will shortly be opened, so in our plans in place of showing present alignment of streets as they are, we have shown the alignment as it will be when opening proceedings are consummated.

On our track layout north of Delmar we have endeavored to reproduce the same facilities that the Wabash has there now. They have a team track, shown in red, extending on the west side of Wabash right of way from which access is now had at Olive street road. Under the revised plan this team track would be placed on the east side of the right of way and access would be had from Hodiament avenue at about the east and west alley of city block 4540.

The proposed grade north of Delmar of the Wabash track is 8/10's of 1 per cent maximum grade.

Drawing 14 of Exhibit 33 is shown drainage details of different sections. First, we have section in Forest Park, sewer running down the middle of the right of way with ditches on either side, with openings every 400 feet, connected with central sewer by 8-inch cast iron pipe. Where it is necessary to build retaining walls, drainage is provided back of walls by concrete lined ditches which discharge into manholes every 400 feet and which are connected again into a central sewer. The roadbed is drained by constructing ditches on [fol. 170] each side of the roadway with tile, so that the roadbed will be drained through the ballast into the tile ditches, thence into the central sewer.

Drawing No. 15 of Exhibit 33 shows typical details of the bridge construction proposed at each of the different streets, all reinforced concrete.

Drawing No. 16 shows the proposed foot bridge over tracks in Forest Park.

Drawing No. 17 of this same exhibit shows the proposed realignment of Grand drive; also shows present and proposed grade along Grand drive.

Drawing No. 20 shows present and proposed grades of De Baliviere avenue; shows maximum grade of two per cent and total rise of about two and one-half feet.

Drawing No. 21 shows proposed conditions at crossing at Waterman avenue with Wabash tracks. At that point the street would rise up and pass over tracks with a maximum grade of $2\frac{1}{2}$ per cent, and the highest point on the bridge would be about three feet higher than the average grade of the street about one hundred feet north and south of Wabash right of way.

At Hamilton avenue the streets north and south of Wabash right of way would have proposed grades of 2.2 and 2.5 per cent, south and north side, respectively, and would rise at the highest point about five feet higher than present grade of streets at points 300 feet north and south of center line of Wabash right of way.

On the Olive Street road very little change would be made in present grade of street and the clearance of proposed railroad bridge overhead would be 13 feet 6 inches.

[fol. 171] Commissioner Flad:

Q. Is the street above the railroad tracks?

A. No, the railroad is above the street and the proposed clearance is 13 feet 6 inches.

On Maple avenue runs a branch of the United Railways Company, and at that crossing it is proposed to elevate the tracks so as to clear the street by 15 feet, and to do this it is necessary to lower the grade of the street about three feet. We have fixed the clearance at 15 feet because quite a number of new interurban street cars require 15-foot clearance. The least clearance in the City of St. Louis is 14 feet and under one of those clearances the trolley of the United Railways cars will come off.

At Bartmer avenue, in St. Louis County, midway between Maple avenue and Etzel avenue, the point at which the proposed track elevation starts on the north, it is proposed for the time being, until such time as the Wabash Railway will elevate its tracks north of Bartmer, to bring the street to the grade of the tracks. We have shown a temporary grade there of 10 per cent to shorten the amount as much as possible in paying damages, figuring that it is only a short time until that track grade should be elevated north of that point.

Exhibit No. 39 shows present grade of Wabash tracks from Grand avenue to Ferguson, Mo. They raise from Grand avenue, with a grade of 1.04 per cent to pass over Vandeventer avenue, from which point they raise with a grade of 1 per cent, then change to grade of 6/10 per cent, have grade crossings at Sarah street, Boyle, Newstead and Taylor avenues, then descend with a grade of .8 per cent passing [fol. 172] ing under Euclid avenue, and Kingshighway, then rise again and pass over Lindell, then descend again to grade at Lindell and Union. They then continue with slightly rising grade to De Baliviere, then rise up to high point between De Baliviere and Waterman, then descend again to point at Waterman, running practically level to Hamilton, then raise again to Delmar, from there to Olive Street Road it rises with slight grade of .5 per cent, then when they pass Etzel, they start with .55 per cent, then continue to rise at 1 per cent grade for about three miles, reaching a height of about 125 or 130 feet higher than Delmar, at which high point they have a grade of 1.2 per cent, then they descend out to Ferguson. Here they have a cut of 56 feet deep.

On the dotted lines is shown proposed grade which we set out. We continue this down grade from Kingshighway with .64 per cent; then .8 per cent; then .65 per cent; then .33 per cent; and from Union to De Baliviere run practically level; then rise with grades increasing to .8 per cent which is continued northwardly until we cross Maple avenue. For the present we come down to present grade of track at Etzel avenue, but whenever the tracks are elevated north of here, this grade is continued on up and crosses Page avenue, the

last street to be crossed, then descending again to make connection with the main line.

The bridges over the Wabash tracks at Kingshighway and at Euclid avenue, just east of Forest Park have clearances less than 18 feet above the tracks and in this plan we have adopted a clearance of 18 feet for all street bridges over the tracks. The limiting of the [fol. 173] clearance to this amount is of the utmost importance because of the unsightly humps which material additions to that clearance would require in the streets and the damages that such street changes would cause to abutting property.

At Lindell and Union boulevards it is now necessary to raise the intersection of those streets about $7\frac{1}{2}$ feet, which can be done without material damage, but any further increase would not only very seriously damage some very fine residence property on Lindell and Union boulevards, but would seriously mar the appearance of this entrance to Forest Park.

Immediately south of De Baliviere avenue, the City has built the Jefferson Memorial Building, the front steps of which are about five feet above grade. Our plans provide for a raise of $2\frac{1}{2}$ feet in De Baliviere avenue. If that grade goes up $6\frac{1}{2}$ feet, the appearance of the building would be lost, losing largely the value of the building.

On Waterman avenue there would be another substantial damage because in any case you get the grade higher than the lots, yet if we raise it 4 feet higher we will have just what we don't want—an obstruction in the street.

Same thing is true at Hamilton and Delmar. An additional raise of 4 feet, using same grade we have now, would raise up about three or four feet in front of the Park Theatre and increase damages to property.

We have made a general study of clearances in other cities, and generally speaking we find that in the large cities opposition to 21 or 22-foot clearances; it not only affects the costs, but disrupts the [fol. 174] street and would make a marked change in the appearance of the City.

We find the tendency is to keep the men off the top of trains. This is very well expressed in a letter I have here which I would like to read. It is from the Division of Public Improvements of the City of New York.

(Letter marked "City's Exhibit 40.")

Mr. Hall:

Q. Did you read something there about clearances in the electric zone?

A. Yes, sir; order issued forbidding employes to ride on top of cars in the electric zone. We have made quite a study of clearances in each of the 10 largest cities of the United States and we have the data here today for every city except Baltimore.

We intended to get clearances from the 10 largest cities, New York,

Chicago, Philadelphia, Detroit, Cleveland, St. Louis, Boston, Baltimore, Pittsburgh and Buffalo. Shortly afterwards we learned that in the new 1920 census that Buffalo had been succeeded by both San Francisco and Los Angeles in population.

This is Exhibit 41. On page 2 of this exhibit is shown the clearances of the Pennsylvania Railroad system in New York City and the Long Island Railroad. On page 3 Long Island Railroad clearances. On sheet 4, the Long Island Railroad, and the New York, New Haven and Hartford Railroad, and on page 5 is the summary of New York clearances.

We found that on the Pennsylvania System there were 13 structures with a minimum of 15 feet 2 inches. We had to consider the [fol. 175] question as to just what would be included. In a number of cities, St. Louis, Cleveland, Pittsburgh, there are a number of high bridges that were not built with any reference to clearance over railroad tracks.

In Pittsburgh some of the bridges pass 150 feet higher than the railroad; we included them and called them 22 feet plus, but we added them as 22 feet. The average for the 13 structures over the Pennsylvania in New York City is 18 feet 17 $\frac{3}{4}$ inches.

The summary shows total of bridges of the Long Island Railroad in New York City as 109, with minimum clearance of 15 feet and maximum 21 feet, with an average of 17 feet 7 inches.

The New York, New Haven and Hartford Railroad with 28 structures, 18 foot minimum with 22 foot plus maximum, with an average of 18 feet 2 $\frac{3}{4}$ inches.

There is a total of 150 structures with an average clearance of 17 feet 9 inches.

Commissioner Simpson: Does the tendency seem to be with the construction of later years that the clearance diminishes?

A. We will bring that out in each state. In New York City we have copies of the orders of the Public Service Commission for the Second District in New York with reference to permitting men to ride on top of cars. These are contained in Exhibit No. 42. Orders of March, 1909, October, 1915, and September, 1920.

On page 6 of Exhibit 41 is given the clearances in Chicago, and pages 7 and 8. On page 9 is given the summary for Chicago, with a total of 110 structures the minimum clearance is 14 feet 1 $\frac{3}{4}$ inches, maximum 22 feet plus, with average clearance of 17 feet 4 $\frac{1}{2}$ inches. [fol. 176] In Illinois the State Public Service Commission prescribes a minimum of 21 feet 3 inches above top of rails. They also prescribe that where conditions make it impossible to comply with those rules, application should be made to the Commission, and then there is a form attached for making such an application and the Commission in Illinois has made quite a number of rulings in the City of Chicago permitting clearances for less than that. Some of these are as follows:

Case No. 4546; on April 5, 1916, the Illinois Central Railroad Co., and the New York, Chicago & St. Louis R. R. Co., were permitted to maintain a vertical clearance of 17 feet between the tracks of the

former company and the lowest point of the overhead structure carrying the tracks of the latter company at Seventy-ninth street, Chicago.

Case No. 10965. On September 27, 1920, the Chicago & Western Indiana Railway Co., and the Atchison, Topeka & Santa Fe Railway Co., were authorized to reconstruct an overhead highway bridge crossing their main track near Sixteenth and Clark streets with vertical clearances not less than sixteen feet as petitioned for.

Case No. 9148. On June 16, 1919, the Chicago & Northwestern Railway Company was authorized to maintain a clearance of 16 feet 6 inches between the top of rails of the main running tracks in its New Wells street yard, and the lowest point of the approach of the proposed Orleans Street Viaduct, being constructed from Austin avenue, to the end of the new Bascule Bridge, on the north side of the north branch of the Chicago River.

[fol. 177] Commissioner Flad:

Q. Is that from the top of the rails or the bottom of the rails?

A. From the top of the rails to the bottom of the bridge. All the clearances given in this data are from the top of the rail to the underside of the bridge structure.

On sheet 10 of Exhibit 41 we have the vertical clearances for Philadelphia, likewise on page 11. You will note on these two pages quite a number of clearances restricted to 15 feet 2 inches on account of electrification. There are thirty-four structures listed where this is true. In computing the average clearance, however, we have not used this restricted clearance, but have used the distance given from top of rail to underside of bridge structure.

Taking the summary for all of the City of Philadelphia on page 15, they have two hundred sixty-one structures with minimum of 14 feet 4 inches, maximum of 22 feet plus, and an average of 18 feet 5½ inches.

We next take up Detroit, Michigan, which is given on page 16 of this exhibit. In Detroit there are a total of fourteen bridges over railroad tracks having a minimum of 15 feet 4 inches, and maximum of 18 feet 2¾ inches, with an average for the entire city of 16 feet 3¾ inches.

In the City of Detroit, the city has just won a case before the Public Service Commission of the State of Michigan requiring the depression of the tracks of the Detroit, Grand Haven & Milwaukee Railway Company, involving twenty-eight streets. Here is the order marked "Exhibit 43." The order of the Commission was that the grade separation should be carried out in accordance with the City's plans, requiring 18-foot clearances throughout.

[fol. 178] Commissioner Flad:

Q. What is the reference to that Commission case?

A. I will submit also a copy of the act requiring 18-foot clearance. This is marked "Exhibit 44."

We next come to Cleveland, Ohio. In Cleveland the tracks of the New York, Chicago & St. Louis Railway Company, known as the Nickel Plate, are being depressed in accordance with an agreement made between the City of Cleveland and the railroad company.

In Cleveland it is the law that the minimum clearance for bridges over railroad tracks is 13 feet *feet* 3 inches. I will submit copy of the General Code of the State of Ohio, which is marked "Exhibit 45." I will also submit a copy of the Ordinance of the City of Cleveland providing for the depression of the tracks.

The Nickel Plate Railroad in depressing its tracks under this ordinance requiring clearance of 16 feet 3 inches over a distance of eighteen streets, and which was accepted by this railroad company, is actually building so as to provide for a clearance of 17 feet from top of rails to underside of the bridges, in order to provide for electrification.

In Ohio the state law requires that the city should pay 35 per cent of the cost of separation of grade. But with reference to paying for this last 9 inches, the city refused to pay any part of it and so the Nickel Plate is paying all the cost of the additional 9 inches of depression.

We now come to the City of St. Louis, data of which is given on page 21, showing summary of the clearance in the City of St. Louis. [fol. 179] There are sixty-three overhead bridges in the City with a minimum of 14 feet 6 inches; maximum of 22 feet plus, and an average of 19 feet $7\frac{3}{4}$ inches.

On page 21 is shown the summary for the City of Boston. There are ninety-nine bridges in Boston with minimum of 14 feet $4\frac{1}{4}$ inches, maximum of 21 feet $7\frac{3}{4}$ inches, and an average of 16 feet $7\frac{5}{8}$ inches. There is not a single clearance in the City of Boston of 22 feet, and only one of 21 feet.

On page 25 of this exhibit is given the summary of such clearance as we got in Baltimore, which consists only of the Baltimore & Ohio railroad. There are twenty-three structures on that railroad with a minimum of 15 feet $5\frac{1}{2}$ inches, maximum of 22 feet plus, and average of 18 feet $11\frac{1}{8}$ inches.

One page 29 is shown the summary of clearances for Pittsburgh, Pennsylvania. There are ninety-seven overhead structures, having a minimum of 15 feet $6\frac{7}{8}$ inches, maximum of 22 feet plus, and average of 19 feet $11\frac{7}{8}$ inches. As in St. Louis, the number of bridges over the river in Pittsburgh brings up the average of the clearances.

On page 32 of this exhibit is shown the summary of clearance in Buffalo, New York. There are seventy-one overhead bridges in Buffalo with minimum of 15 feet, maximum of 22 feet plus, and average of 18 feet $3\frac{1}{4}$ inches.

I neglected to state that in Massachusetts it is the law that the clearance shall be of a minimum of 18 feet, and since the passage of that law all clearances are built 18 feet. I submit copy of General Railroad and Railway Law of the State of Massachusetts, which is marked "Exhibit 47."

[fol. 180] Exhibit 48 is a summary of clearances of all the bridges that we tabulated in the United States, there being 997 overhead structures with a minimum of 14 feet, maximum of 22 feet plus, and average of 18 feet 4½ inches.

Coming back to St. Louis, the City of St. Louis has done more to increase the clearances over railroad tracks than all of the railroads in St. Louis put together. In the City of St. Louis there are eleven structures having 22 feet or more of clearance: The Merchants Bridge over tracks along the levee, Municipal Bridge built by the City of St. Louis, the Twelfth Street Viaduct, all of which was paid for by the City of St. Louis, the Eighteenth Street Viaduct, Jefferson Avenue Viaduct, Grand Avenue Bridge, Chouteau Avenue Viaduct, Tower Grove Viaduct, Kingshighway Viaduct, Vandeventer Avenue Viaduct and the Morganford Road Bridge.

When the City of St. Louis built the Twelfth Street Viaduct, the original viaduct built many years ago was paid for principally by the City of St. Louis; the railroad paid \$10,000. The old clearance was 18 feet and less. That viaduct was reconstructed by the City at a cost of \$107,008, and paid all damages and gave every railroad a clearance of 22 feet, costing the City considerable more in damages.

The Eighteenth Street Viaduct, when originally built, the City received \$17,500 towards the cost of construction. It was rebuilt in 1910 at a cost of \$196,107, paid wholly by the City. That is also a 22-foot clearance.

The old Jefferson Avenue Viaduct had clearances varying from [fol. 181] 16 feet 2 inches to 18 feet 6 inches. That was rebuilt by the City of St. Louis at a cost of \$101,640. The City got the four railroads passing underneath to pay \$46,000, but the railroads were not asked to contribute until the plans were completed, and the railroads paid no part of the damages caused by raising that bridge.

The Grand Avenue Bridge cost \$548,000; one railroad paid \$15,000. That bridge has a clearance of about 36 feet over railroad tracks.

The Kingshighway Viaduct was built entirely at the expense of the City of St. Louis, and cost \$522,000.

Chouteau Avenue Viaduct was built by the City and paid for by the railroad companies, the City paying all consequential damages, which amounted to \$100,000. That is another instance where the City took the initiative in increasing clearances.

We have two bridges in St. Louis that were paid for by railroad companies which give 22 feet clearance. One is the viaduct at Tower Grove, paid for by the railroad company, \$604,000, and the City paying damages to abutting property caused by the raise in the street, amounting to \$221,000.

We have at Morganford road a bridge over the Missouri Pacific with clearance of 31 feet. At that point the Missouri Pacific runs in a cut of 35 feet; while all the other bridges over this branch have clearance of 18 feet.

Now, the City of St. Louis, in asking for clearances of 18 feet

for these bridges proposed to be built over the Wabash, has no apologies to make. Wherever it has built bridges over railroad tracks, with clearances of 22 feet, those bridges have been built over large railroad yards where there was a great deal of switching to be [fol. 182] done, and where it was necessary for men to ride on top of cars.

But in this district between Delmar and Kings-highway there is no industry there, and no chance of there ever being one there, and there is no occasion for men riding on top of cars.

I have studied this Wabash matter out here for several years, and I have never seen a man ride through that district on top of a car. I have made inquiry of the railroad employes, and have been told that when trains bring out cars from the City and spot them in the industries north of Delmar, that men sometimes ride on the cars and give their signals from the top of the cars.

What we would like to have the Commission do here is to adopt a clearance of 18 feet, and if you want safety, prohibit men riding on the cars.

Of the twenty-one trains listed in the Wabash timetable, fifteen are passenger trains and only six are freight trains. Now, while we admit that 18 feet will not permit a man to safely stand on top of the cars, we do contend that it will clear any railroad equipment.

Now, to prove that, we have tabulated from the official Railway Equipment Register the clearances first of all freight cars in the United States, Canada and Mexico, and we submit this as Exhibit 49.

There are 2,938,366 freight cars.

Two thousand five hundred fifty-four of these are over 15 feet. We have looked up those over 15 feet and we find there are 2,513 that are 15 feet $1\frac{1}{4}$ inches high; that there are three cars of unknown height above 15 feet, and thirteen cars of 15 feet $\frac{1}{4}$ inch. [fol. 183] Twenty-one thousand four hundred ninety-seven or 73 per cent, are between 14 feet $6\frac{1}{8}$ inches and 15 feet.

Four and thirty-two one hundredths per cent are between 13 feet 6 inches and 14 feet.

Twenty-two per cent are between 13 and 13 feet 6 inches; 11 per cent are between 12 feet 6 and 13; 7 per cent are between 12 and 12 feet 6; 15 per cent are less than 12 feet. Of the flat, gondola, etc., cars, there are a little over a million, or 34 per cent.

Summarizing this, we find that about half of the cars are less than 12 feet high, or 49.66 per cent; over 12 feet, 46.53 per cent, and of unknown height, 3.81 per cent.

Now, we have looked into the railway locomotives. We have a letter here from the Baldwin Locomotive Works, under date of March 9th, 1921, in which it sets forth that the modern, standard-gauge locomotives used in this country average about 15 feet; and this was the limit set for the standard locomotives ordered by the United States Railroad Administration, and that while there are, of course, some variations of certain individual roads, they seldom amount to more than 6 inches above or below.

Witness offers letter as Exhibit 50.

We have also a letter here from the American Locomotive Company (witness reads same), marked "Exhibit 51." We wanted to know the size of the largest locomotive they ever built, and this is the letter they sent us under date of March 18th, 1921. Also set of blue prints marked "Exhibit 52," showing maximum height of 17 feet 8 $\frac{3}{4}$ inches, built for the Denver & Salt Lake Rail-[fol. 184] road. There are a number of others here, but none of them getting anywhere near 18 feet.

Q. Mr. Bowen, we will start in with the Rock Island.

A. This is Exhibit No. 53. This drawing shows the Wabash right of way from Union boulevard out to De Baliviere, then the Wabash tracks running northwestwardly across Terminal Railroad tracks. It shows at this point the tracks diverge from the Wabash tracks and turn west and run through Clayton and then turn to the northwest, reaching a point designated as Elmwood Park. It also shows the tracks of the Terminal Railroad running generally east and west across Wabash tracks and then turning to the south and running parallel with the Rock Island tracks, and crossing the Rock Island tracks.

About ten years ago the Rock Island built a connection between Elmwood Park and the Terminal Railroad and since then has brought its freight trains into St. Louis over the Terminal Belt Railroad and has built its freight yards and terminals near Carrie avenue in North St. Louis. So that to day the Rock Island timetable shows only four trains passing through the route where it runs with the Wabash, and these are all passenger trains. The Rock Island has two passenger trains each way daily running out this line.

In 1916 we suggested to the Rock Island that it abandon its line between De Baliviere and the western city limits and make a connection between the Wabash and this Terminal west belt railway, and run these four passenger trains that way along the same line that it ran its freight northwesterly along Terminal Railway tracks.

[fol. 185] East of Union boulevard the Rock Island and the Wabash use joint tracks all the way into Union Station. This plan would simply mean that they would use the Wabash tracks from De Baliviere out to Page avenue, and then use their own connection with the Terminal belt tracks and then cut over their own right of way.

Q. Where is Clayton on this map, or where would it be?

A. Just about the southernmost corner of the map. Turning this around there is given the railroad distances from Elmwood Park to De Baliviere over the present route and over proposed route it is 628 feet shorter than over the present route.

In connection with our proposal to the Rock Island to run its trains over the Wabash tracks, as stated before, the City of St. Louis with the consent of the Rock Island would condemn that portion of its right of way west of De Baliviere for a street and would guarantee to the Rock Island that it should get at least \$72,960 for

that portion of its right of way, amounting to about thirty cents a square foot.

The City of St. Louis took up with University City the question of condemning the right of way westwardly to Forsythe boulevard under certain terms and conditions and University City passed resolution that whenever the City of St. Louis could effect this agreement with the Rock Island, it would carry out its portion of the agreement.

Here is Exhibit 54. This drawing shows the Rock Island right of way running west from De Baliviere to the city limits and beyond.

The Rock Island right of way in here is 60 feet wide. Immediately adjoining the Rock Island on the south is a tract of land called the Catlin tract, which is 560 feet deep. This land fronts [fol. 186] Lindell boulevard. It was thought it would develop into very high class residence property; it has not come to expectations of original purchasers inasmuch as the lots are too large and too deep and the development of the automobile has made it possible for citizens to acquire large tracts of land outside of the City at much less cost.

By taking this 60-foot right of way and 40 feet of this tract, making 100-foot street, and giving another frontage to this property; then after the Wabash tracks had been depressed, to construct a bridge across these tracks, connecting with Pershing avenue at De Baliviere, and by putting the tracks of the United Railways Company on that bridge, make possible the taking down of the unsightly structure over the Wabash tracks which is used at present.

West of the City of St. Louis this street would run north side of Washington University and run on out and connect with these streets in University City.

In 1916 or the early part of 1917 a short time before the railroads were taken over by the National Government, we had taken this matter up with the Rock Island and I have a letter from the Chief Engineer of the Rock Island with reference to the proposal which I would like to read. This is dated July 25th, 1917.

Objected to by Mr. Burns as being incompetent, irrelevant and immaterial at this time; objection overruled.

Letter is read and marked "Exhibit 55."

Mr. Burns:

Q. You don't know whether any of those conditions were able to be brought about?

A. We have, since the war, taken this matter up with the officials [fol. 187] of the Rock Island. I visited the Vice-president of the Rock Island in the latter part of December, 1920; he assured me he would do what he could to arrange with the Wabash and find out what terms he could get from the Wabash to effect proposed change.

I appreciate the fact that the Rock Island in view of present unsettled state of this question would not want to admit at present that

they had any such plan in view, and it is with considerable delicacy that we bring this question up; but the officials of the Rock Island, Mr. Fritch, Vice-president, and Mr. Morse, Chief Engineer, felt this would be a formation that would probably come about; with that idea we worked, and it is with that idea we have prepared and worked out the details of this plan.

Seeing the possibility of these negotiations failing, or it becoming necessary for the Rock Island to retain present right of way, we prepared a plan that is still perfectly possible and feasible to make connection with the Rock Island and to provide for the elimination of their grade crossing.

There is a very important crossing for the Rock Island over Skinker road today, with two street cars passing over it, and a very great amount of traffic, because Skinker road is the only street inside of the City of St. Louis running north and south west of Kings-highway, a distance of about three miles.

The Rock Island also has some important crossings outside of the City of St. Louis, one at Pennsylvania avenue.

Commissioner Flad: It is only about two miles from Kings-highway to Skinker?

[fol. 188] Q. Proceed with the theory of leaving Rock Island as it is.

At this point an adjournment was taken to Thursday at 10 a. m.

Thursday, March 21, 1921.

Mr. BOWEN recalled.

Mr. Daues:

Q. We will start with Exhibit 56. This drawing shows proposed method of adjusting the Rock Island Railway to the proposed depression of the Wabash tracks; it also shows the method of separating grade crossing at Skinker road. Also method of separation of grade crossing at Pennsylvania avenue, in University City.

The ruling grade of the Rock Island west towards Clayton is 1.5 per cent. On this profile we have shown a maximum grade of 1.08 per cent. Between that and proposed grade of the Wabash at De Baliviere, the proposed grade would rise with maximum grade of 1 per cent and pass over the River des Peres. That grade would be based on the assumption that the River des Peres would not be sewered at the time of this work.

Notice here that it is marked 69.02 feet; the high water of the River des Peres in August, 1915, was 69.4, so that high water would not reach the bottom of the bridge; moreover there were three lines of pile supports in the bed of the river which offered a considerable obstruction to flow of the water. If a new bridge is built at that point, it should be built with a clear span so as not to obstruct flow [fol. 189] of water. Then it would run at a grade of 4 10 of 1 per cent to Skinker road, at which point it would pass under Skinker road about nineteen feet below present grade of Skinker road.

From that point it would rise and meet present grade of tracks at a point about two thousand feet west of Skinker road.

The steepness of grade of Rock Island running west from Pennsylvania avenue is so marked that it would be impracticable to separate grade crossing by any method other than elevated tracks.

It will be necessary to elevate tracks over Pennsylvania avenue. We have shown on this drawing a depression of the street of about 10 feet, and an elevation of the tracks of about 7 feet, giving a 17-foot clearance over Pennsylvania avenue. The grade could be made very much less than the grade we have shown here, with the work carried out after the River des Peres is sewered.

In order to attain the depression of tracks at the low point of Skinker road, it is proposed to construct a 24-inch sewer running from that point and connecting with the sewer proposed to be constructed across Forest Park.

This is also based on the assumption that the work should be carried out before the River des Peres sewer is built. This proposed sewer would pass under the bed of the River des Peres.

I submit two official time-tables of the Rock Island, one effective January 16, 1916, marked "Exhibit No. 57," the other effective November 21, 1921, marked "Exhibit No. 58." These time cards will show the number of trains on the Rock Island during those respective years. It will be noted from the time-tables that the traffic consists of four passenger trains daily in each of those years on the Rock Island.

I now offer official time-tables of the Wabash Railway Company, one effective February 27, 1921, marked "Exhibit No. 60," and one effective April 30, 1916, marked "Exhibit No. 59," to show number of regular trains scheduled to pass on the Wabash line between Kingshighway and Delmar boulevard.

From that of 1916 you will note there were fifteen passenger trains a day and five freight trains. From that of 1921 you will note that there are six freight trains and fifteen passenger trains.

I also submit, as Exhibit No. 61, copy of the ruling of the State Public Utilities Commission for the State of Connecticut, prohibiting men from riding on top of cars in the electrified zone in that state. This is a revision of the rules of the New York, New Haven and Hartford Railroad Company, for the purpose of increasing the safety of certain employes operating trains or moving freight cars in the electric zone. Employes shall not be permitted to go on top of cars, cabooses, electric or steam locomotives or tenders within yards at such points where the clearance between the conductor wire and the top of rail is less than 21 feet 6 inches.

I wish to discuss some features of drainage with reference to proposed Wabash cut. August 20th, 1915, St. Louis was visited by a remarkable storm. It produced a rainfall of 10 inches in twenty-four hours, after a previous-day rainfall in excess of 1 inch.

The previous record since 1848 was 5.08 inches in 1897, in twenty-four hours. So in that period of sixty-seven years the highest rain we had was just about half the rainfall in St. Louis in the flood of August, 1915.

In 1818 a doctor in St. Louis made a record of a rain which he gave as 8.02 inches in twenty-four hours. That, however, is not official. Since 1818, thirteen years before the Civil War, or the time the Treaty of Mexico was signed, the record was 5.08. That storm of 1915 caused the water to rise $4\frac{1}{2}$ feet above Wabash tracks at Delmar boulevard. I would like to note some features of that storm given by the Government Weather Bureau for August, 1915. We can't file this in the record, because we have been unable to get another copy, therefore, you will pardon me if I read rather fully from this report. This storm was classed as a West Indian hurricane.

The tropical storm of August 10, 1915. Some historical data. Records of West Indian hurricanes are available, at least as to time and locality of occurrence as far back as 1493; from that year to the present, four hundred ninety-two storms were noted, an average of a little more than one each year.

The great storms that reached the United States were, of course, not very numerous, yet they occurred with sufficient, though very irregular, periodicity to warrant the reasonable expectation of one every few years.

Severe tropical storms visited Galveston in the years 1834, 1837, 1847, 1854, 1866, 1867, 1875, 1886, 1900, 1909 and 1915. Those of 1900 and 1915 were by far the most violent. The more severe tropical storms of recent years in the United States were: * * * Then a list is given of thirty-one tropical storms between 1873 and that of August, 1915, for a period of forty-two years. Nineteen of [fol. 192] these are classed Atlantic coast storms; one Porto Rico and one Florida; six as Gulf and three as Texas and Galveston storms.

As shown on this map, the course is from east to west in the tropics through the Gulf and into Texas, then north, then northeast.

"According to Prof. Fessig's computations, the mean paths for June and July originate between latitude 10 degrees and 15 degrees north, and do not recurve until they reach about latitude 27.5 degrees north in longitude 86.5 degrees west (east central Gulf of Mexico), whereas the mean paths for August, September and October originate north of latitude 15 degrees and recurve over Florida or the adjacent ocean, the August one on the west coast, the September one over Southern Florida, and the October one at a point just touching the extreme southeast coast, but with a movement much more toward the east.

"It is a fact, however, that some of the most violent storms move as far west as the Texas coast before recurving, notably those of 1900 and 1915, indicating clearly that the probability of recurve and the point of recurving are governed almost entirely by pressure distribution to the northward.

"The storm of 1915." I won't read the complete description, just from point to point. The figures 1 to 12 on this map show the paths of the storms of 1900 and 1915; also pressure conditions that prevailed during the passage of the storm of 1915.

"I draw your attention to this graph of the storm of 1915 (exhibiting map, describing storm's course). This storm passed very

close to St. Louis on August 20th. Another thing I want to bring [fol. 193] out is that the path of the storm of September, 1900, passed the latitude of St. Louis about 8 degrees west of St. Louis, a distance of a little more than four hundred miles.

"The storm was first observed on the morning of August 10th, between the Windward Islands of Barbados and Dominica, and at 9:45 a. m. on that date the first warning notice of the storm was sent to West Indian stations.

"On the morning of August 11, the disturbance was apparently near and south of the Island of St. Croix, at about latitude 16 degrees north, longitude 96 degrees west.

"During the night of August 12-13 the storm center passed north of the Island of Jamaica, and at 8 a. m. of the 13th a whole south-east gale was blowing at Kingston. Northeast storm warnings were then ordered at Key West and Miami, Florida.

"On the morning of the 14th the storm was apparently central near the Isle of Pines, Cuba, with undiminished intensity and moving in a direction a little north of west.

Advisory warnings on that morning, which were sent to all interested, stated that the storm would probably pass into the Gulf of Mexico that (Saturday) night. During Friday night the maximum wind velocity at Habana was 56 miles an hour from the east.

On the morning of the 15th the storm was apparently central in the south central Gulf of Mexico, moving in a more northwesterly direction than before. The barometer at all Gulf stations was falling and northeast storm warnings were therefore ordered on the Gulf Coast from Appalachiecola, Florida, to New Orleans, Louisiana. The [fol. 194] storm was moving with a wind velocity of 74 miles an hour from the east.

On Monday morning, August 16th, the storm center was apparently approaching the east Texas coast and the warnings from Mobile to Appalachiecola were changed from northeast to southeast. At this time the barometer at Galveston read 29.62 inches, with maximum wind velocity of 34 miles an hour from the northeast.

At 8 p. m. Monday, August 16, the barometer at Galveston read 29.10 inches with maximum wind velocity of 72 miles an hour from the northeast, and heavy rain was falling. The storm passed into the interior during the night of August 16-17 and at 2:15 a. m. on Tuesday, August 17th, the barometer at Galveston read 28.63 inches, with maximum wind velocity of 93 miles an hour from the east at 2:37 a. m. At 5:30 a. m. of the 17th the barometer at Houston read 28.20 inches with a maximum wind velocity of 80 miles an hour (estimated) from the northeast.

At 8 a. m. Tuesday, August 17th, the barometer at Galveston read 29.12 inches, with the wind blowing 52 miles an hour from the northeast, while at Houston the reading was 28.72 inches, with a wind of 80 miles velocity (estimated) from the southeast. Torrential rains had fallen at both places and were extending into the interior of east Texas.

The storm then recurved to the northward, with high winds over the interior of east Texas, reaching a maximum of 80 miles an hour from the north at San Antonio during the day.

On the morning of August 18th the storm was central over the northern portion of east Texas, with a barometer reading of 29.50 [fol. 195] inches at Fort Worth and Dallas with northeast gales of 44 to 48 miles an hour and with heavy rains.

During the next twenty-four hours the storm moved very slowly to extreme northeast Texas with somewhat diminished intensity, but with heavy rains continuing in that vicinity and extending into Arkansas. The storm was now moving northeastward and on the morning of the 20th was central over southeast Missouri with somewhat increased intensity, and heavy rains had fallen in southern and eastern Missouri, the lower Ohio Valley and west Tennessee, and northeasterly gales prevailed at St. Louis.

During the next 24 hours the storm moved slowly to southern Indiana, again diminishing in intensity but with general rains and some high winds to the southeastward. It then continued its north-eastward movement with steadily diminishing intensity, but with general and, in many places, heavy rains, and on the morning of August 24th was passing out into the Gulf of St. Lawrence, with a barometer reading of 29.80 inches at Father Point.

That is the description of the storm. There is some reference to floods. Before I mention the flood, let me read this comparison with the flood of September, 1900.

Paths of the storms of 1900 and 1915

An inspection of these paths discloses the fact that the total time occupied from the first to the last appearance of both storms within the field of observation was exactly 14 days, and that the storm of 1900 moved with a slower velocity of progression before reaching its recurve than after, whereas in the storm of 1915 the reverse was true. [fol. 196] The two paths are very similar in many respects, although that of 1915 lay a little to the southward of that of 1900 until the St. Lawrence Valley was reached. In previous published reports on the storm of 1900 the storm path shows a strong deflection toward the southwest Florida coast, but reports received from vessels and other sources after these publications indicated the fact that this deflection to the right was not so strong as has been supposed, and the track as here charted is thought to represent more nearly the true conditions. It was carefully plotted from all available observations.

As to the comparative intensities of the two storms, it is perhaps idle to speculate. The wind velocities were not greatly different and the effects of the two storms were much the same, except as modified by artificial conditions in the vicinity of Galveston.

Floods in connection with the West India hurricane of August 13-23. The above named, in its course northeastward from the Texas coast, was associated with heavy rains, particularly to the northwest and north of its center, the regions of heavy rains and dates being as follows:

Seventeenth. East Texas and Northern Louisiana.

Eighteenth. East Texas, Northern Louisiana and Eastern Oklahoma, Western Kentucky and Tennessee.

Nineteenth. East Texas, Northern Louisiana, Arkansas, Tennessee, Western Kentucky and Southern Missouri.

Twentieth. Western Tennessee and Kentucky, Southern Missouri, Southern and Central Illinois and Indiana.

Twenty-first. Lower Ohio Valley.

[fol. 197] The total duration of the rains was thirty-six to seventy-two hours. In the beginning the rains were light to moderate; in the last thirty-six hours, however, they were heavy, but the latter characteristic was not noticed after the storm center passed beyond the Ohio Valley on the 22nd.

The distribution of precipitation about the center of a tropical cyclone (or West India hurricane) is uniform, while the cyclone is in equatorial region; in this particular the tropical cyclone differs from the extra tropical.

In the storm of the 13th to 23rd, the tropical characteristic as regards the distribution of precipitation about the center was seemingly maintained until the storm center reached the lower Ohio Valley, although there were sections in its path where precipitation was both less intense and less uniformly distributed than at others.

Thus in Arkansas the rains were quite heavy in the southwest portion of the state, considerably less intense in the storm's path through the middle portion of the state as it crossed the valley of the Arkansas River. The intensity of the precipitation was again renewed, however, in the northeastern portion of the state and the adjoining portion of Missouri. This fact has an important bearing on the floods in Arkansas rivers as will appear later in this report.

The White River, an important tributary that enters the Arkansas on the left bank near the junction of the latter with the Mississippi, reached the highest known stages along the upper and middle stretches of the stream. At Calico Rock, the previous record of 43.1 feet, on February 14th, 1884, was exceeded by eight feet; at other [fol. 198] points the excess above previous high water was much less. These remarkable stages were caused by continued heavy rains over the upper watershed of the White, the total fall in the three days, August 17-20, being ten inches or more.

As previously stated, the intensity of the precipitation in connection with the West India hurricane of August 13th to 23rd was markedly different in portions of its path through Arkansas, diminishing from ten inches in Polk and Howard Counties to less than six inches in Faulkner, Cleburne, Pulaski, Jefferson, Arkansas, White, Woodruff and Monroe Counties, in the valley of the Arkansas River, in the central part of the state.

It is possible that the increased precipitation in Arkansas was due to topographic features, since many of the heaviest falls were reported along the eastern edge of the Ozarks, which here rise 500 to 1,000 feet above the valleys in the eastern part of the state.

The Meramec of Missouri. This stream has its origin in the eastern foothills of the Ozarks, in the southwestern part of Missouri, and flows in a northeasterly course, discharging into the Mississippi about twenty miles south of St. Louis. The Weather Bureau does not maintain any station along its course. The following account

of the flood was extracted from the Engineering News of September 21st, 1915:

The rain of August 19—21 in the St. Louis district caused disastrous floods in the Meramec River to the south and west of the City, the greatest damage probably occurring at Valley Park, about twenty miles to the southwest.

[fol. 199] According to the best reports, the river rose about seven feet on the night of the 19th and about seventeen feet additional on the 20th. It was practically stationary during Saturday, the 21st, and it was generally assumed that high water had been reached, but during the night of the 21st and the day of the 22nd, an additional rise of 19 feet occurred, making a total of 43 feet above low water. This submerged practically the whole town well above the ordinary second story level, and a large part of the rise having come during the night, it appears that a majority of the people were marooned in their own houses. As far as can be ascertained, however, no lives were lost, but the damage to property was enormous.

This stage of the Meramec was probably partly a result of the condition of the Mississippi River, into which the former discharges 20 miles below Valley Park. The Mississippi rose from a stage of 22 feet on Thursday to a stage of 30 feet on Sunday.

Just to show the general effects of the storm throughout the country, I want to refer to the files of the St. Louis Globe-Democrat for August, 1915.

Starting with an article on August 17, 1915, 5,000 flee as Galveston is hit by storm. Ninety-mile gale sweeps over city, flooding streets, imperiling hundreds of buildings on water front. Immense sea wall still holds firm. Army wireless station receives report from United States Transport Buford at Galveston, that the water had risen ten feet and that several vessels had turned over in the hurricane.

The next important notice is on August 19th, 1915, with headline, "Hundred lives lost in \$15,000,000 storm on Gulf Coast. Fourteen die in Galveston. Loss to property put at \$7,500,000. Greetings sent out to the world by citizens of Galveston that Galveston has successfully passed through a West India hurricane. Damage in Houston, \$2,000,000. One thousand feet of Galveston sea wall swept away. Five hundred houses destroyed."

The next notice of the storm is on the morning of August 20th. The storm struck us that morning. Here is headline, "Hundred and twenty-one lives lost; hundred and fifty-eight are missing in Gulf storm. Most of those unaccounted for in hurricane-swept area are believed to have perished. Wilson wires sympathy, offers aid to Governor."

The next day, August 21st, of course shows an article of our own storm. Starts off with "Thousand and twenty-five families are made homeless by St. Louis flood." And here are photographs with heading "Using boats in streets to rescue families marooned by flood," and a number of pictures showing the flood in South St. Louis caused by rise in River Des Peres. One picture shows a lot of lumber lodged underneath the Broadway Bridge over the River

Des Peres. Five lives believed lost. Damage, \$1,000,000. Hundreds are rescued. Thousands imperiled by high waters; 7.02 inches of rain falling in twenty-four hours. Thirteen in danger of drowning at 2 o'clock this morning. Nine inches of rain in west end.

And on the same day: "Many are made homeless in St. Louis County. Thousands of acres under water ranging in depth to fifteen feet. Meramec River is several miles wide." There are some pictures here showing buildings destroyed by the flood. Picture of a street four feet under water. Here is a picture of the Wabash [fol. 201] Station at Delmar boulevard which was damaged by the flood. Firemen take fifteen passengers from shelter and depot just before the collapse.

The next reference to the flood is on August 22nd. "Twelve drown in St. Louis flood. Others missing. Hunt for bodies made all night. Railroad service still is demoralized, but United Railways resumes schedules." And on the same day: "Death list in Texas storm climbs to 256. Property damage totals fifty million in the state. Governor Ferguson asks aid for smaller villages."

Next reference to that storm is the flood in the Meramec, August 23rd. "Twelve dead in Meramec flood reported to Coroner." Then appears picture showing where survivors *where survivors* of Valley Park flood are being landed by the boat load. Also picture of the of the Frisco Hotel at Valley Park, the main hotel, apparently four or five feet under water, and showing people being carried around in boats. "Horror of scene on Meramec described by an eyewitness. Two thousand homeless in Valley Park alone. Dozens are missing. Water is ten feet deep in town, and many are clinging to house tops and trees begging for succor. One hundred persons rescued at Meramec Highlands. Twelve men and eight women taken from top of K. C. Club House. Streets of Valley Park patrolled by Sheriff's men to prevent looting." And here are pictures of the flood at Valley Park. "Eleven rescued from roof of Metta Canoe Club." There is picture showing three survivors on roof of porch of a house apparently awaiting succor. Another picture, Frisco Station at Valley Park apparently three or four feet under water.

Again, on August 23rd, "Railway traffic is demoralized by flood [fol. 202] of the Meramec. Frisco loses steel bridge two miles south of Ten Broeck."

Next reference to the storm is on August 24th. "Eleven bodies of flood victims are reported." And here are pictures showing railway tracks left in mid-air by flood.

East side homes surrounded by water. Here is a picture showing the Illinois Terminal Bridge embankment washed out at Edwardsville.

August 25th, five thousand one hundred and ninety-seven dollars is raised for destitute in flood area: contributions yesterday.

Here is a picture on August 25th showing the Frisco Bridge over the Gasconade River at Jerome, Missouri; the river here is shown at great width, and the water is apparently up to the deck of the bridge.

Now, that flood produced a lot of water in and around St. Louis. I have some photographs I want to submit as exhibits.

Exhibit 62, photo, showing the Wabash cut flooded with water at Kingsbury avenue.

Q. When was that taken?

A. That picture was taken August 20th, 1915.

Exhibit No. 63. This picture shows Waterman avenue and Wabash tracks under water. All of these pictures were taken on the same day.

Exhibit No. 64. This picture shows De Baliviere avenue, looking southwardly towards the Wabash tracks and the Jefferson Memorial Building.

Exhibit No. 65. This picture was taken August 20th; shows Forest Park under water; looking westwardly from the Clayton Bridge.

Exhibit No. 66. Taken same day, shows another part of Forest Park under water.

[fol. 203] Exhibit No. 67. Looking west from Kingshighway Viaduct, shows railroad yard under water. The Frisco at one point of its track was 12 feet under water.

Mr. Rodehaver:

Q. Has the Frisco since raised that track?

A. Not to my knowledge.

Exhibit No. 68. I don't know the exact date of this picture, but it shows flood at Frisco Station at about same time. Close to the 23rd.

Exhibit No. 69. Shows water at Valley Park, Meramec River.

Exhibit No. 70. Also shows high water at Valley Park caused by Meramec River.

I call attention to a picture in Railway Age Gazette, page 393 of the issue of August 27, 1915. I wrote the chief engineer of a number of railroads entering St. Louis requesting them to give us an idea as to what effect that storm caused to their roadbeds and tracks. I will read the answers:

Exhibit No. 71, letter from H. H. Peck, engineer of Missouri District of Chicago, Burlington & Quincy.

Exhibit No. 72, letter from H. T. Douglas, Jr., chief engineer Chicago & Alton Railroad Company.

Exhibit No. 73, letter from C. A. Paquette, chief engineer of the Big Four.

Exhibit No. 74, letter from F. G. Jonah, chief engineer, Frisco Railway.

Exhibit No. 75, letter from E. A. Hadley, chief engineer, Missouri Pacific Railroad.

Exhibit No. 76, letter from F. L. Thompson, chief engineer, Illinois Central Railroad.

Now, considering the probability of a recurrence of the storm that

[fol. 204] would produce eight inches of rainfall in the River Des Peres watershed. Of the thirty-three great storms that are described in the report of the engineers for the Miami Valley Conservancy District, in which data are given concerning all storms east of the 103rd meridian that occurred from 1892 to 1916, a period of twenty-five years, and produced a precipitation that in three days amounted to as much as six inches or more, only one West Indian hurricane is given that reached as far north as St. Louis, that of August, 1915. This engineer made a record of every storm that in three days produced as much as six inches of rainfall, and they found 130; and they then selected the thirty-three greatest storms that lasted as much as five days. In that list of thirty-three they found only one West Indian hurricane that produced as much as six inches of rainfall in three days that passed the latitude of St. Louis, that of August, 1915, a storm which required four days to reach St. Louis.

That report covered a period of twenty-five years and is claimed by its authors to be the most complete study of rainfall data ever made, either in this country or abroad.

That might lead one to believe that once in twenty-five years you might expect a West Indian hurricane as far north as St. Louis and producing as much as eight inches of rainfall in twenty-four hours.

Of the thirty-one severe tropical storms that occurred since 1873, listed in the August, 1915, issue of the Monthly Weather Review of the United States Weather Bureau, those of 1900 and 1915 are stated to have been by far the most violent and are the only ones extending as far north and west as St. Louis.

[fol. 205] These storms occurred fifteen years apart, and as the storm of 1900 did not produce sufficient rainfall to be listed at all in the Miami report it is undoubtedly safe to say that the frequency of tropical storms extending as far north and west as St. Louis, and producing precipitation of 8 inches in St. Louis, would not be less than one in fifteen years. I don't think that would be too infrequent when the only record is one in twenty-five years.

As the two tropical storms referred to passed latitude of St. Louis 400 miles apart, and as the storm of August, 1915, produced a precipitation on an area which measured about 40 miles in its path from east to west, it is also fair to say that the chances of a similar storm producing such a precipitation at any point of that 400-mile wide path of such storms would be one in ten. Then, according to the record of these two West Indian hurricanes, the probability of such a storm recurring and striking any point and producing as much as 8 inches of rainfall in the 400-mile width would be once in one hundred and fifty years.

There is another factor, however. The storm of August, 1915, did not produce a continuous rain belt extending north from the Gulf, and having in twenty-four hours a uniform precipitation of 8 inches, on the contrary it produced such an intensity in only four places; that nearest St. Louis measured about twenty-five miles from north to south and reports seem to indicate that that was about the heaviest precipitation. If the other three were of equal extent, then

the total length of the 8-inch rain belt, from north to south, would be 100 miles; and as the distance from the Gulf to St. Louis is about [fol. 206] 800 miles, that would introduce a further factor of 8 resulting in the probability of recurrence of one in twelve hundred years; with the official Government record that since 1818 we never had a rainfall that exceeded half of that in August, 1915, we would not probably be considered rash if we made no provision against a flood of that character; but in order to make this case as airtight as we know how, we have provided in our plans for a recurrence of such a flood as that of August, 1915, and are placing a dam 10 feet high against water getting onto the Wabash tracks. In the first place, however, it is not a fatal thing to have water get on the railroad track. In that connection I would like to read a paragraph from Wellington on Railroad Location, page 73, edition of 1908 (reads paragraph):

Exhibit No. 77, large model, introduced.

In the first place, Delmar boulevard being raised on earthen embankment higher than elevation 81, and Rosedale avenue, throughout is higher than elevation 81, it would be impossible for the water to get on the tracks across Delmar or across Rosedale. Along the west side of the Wabash we provide for a wall, the lowest point of which will be at elevation 81, and which will extend northwardly until it meets the subgrade of the railroad embankment; on the east side the railroad embankment will be intersected by the ridge formed by the alley between Clemens and Cates; it never gets to a grade less than 81, except right at Hodiament, 82, and we intend to raise that small strip of alley to 84; so it would be impossible for the water to pass around that way. Hamilton avenue raises to [fol. 207] the north to a point where it reaches 125, and at no point would it go lower than about 90, north of Cates avenue.

The probability of water getting on Wabash track is this: in the district immediately north of Delmar are inlets from the sewers discharging in the River Des Peres; it might back up through these inlets and pass onto the tracks, but that is prevented in this way: this wall is continued 3½ feet above the surface of Hodiament, and that wall is carried as a handrail from the first street north of Delmar all the way to this alley, as a solid wall, always 3½ feet higher than Hodiament. As the lowest here is 81.5, the wall never gets below 84.

On the absurd probability of a recurrence of such a flood, St. Louis is willing to go ahead. This property over here would be under the danger about once in every one thousand years of being flooded 4 or 5 feet.

The things that remain to be proven are that with a recurrence of rainfall of 10.13 inches in twenty-four hours as in 1915, the height of the water north of Delmar would not be raised to elevation 81. In the flood of 1915, a large portion of the water, about one-third of the whole discharge of River Des Peres, went down the Wabash cut to De Baliviere avenue, then crossed into Forest Park. By

confining that water to the channel, you would have to take care of that additional amount of water. Mr. Horner will go into that and show the water will not rise to elevation 84.

This is all based on supposition that the rest of this work should be carried through before the River Des Peres sewer is built.

The recent vote for issuance of bonds to build River Des Peres [fol. 208] sewer received a majority vote of 50 per cent, but did not receive the 56 $\frac{2}{3}$ necessary to pass it.

Before leaving this model, I would like to discuss the method of caring for this high-class property. Property west of the Wabash right of way and north of Delmar is an industrial district; this property east of the Wabash, between Cates and Delmar, high-class residence property; this shows plan of setting out trees along here to effect a screen between railroad right of way and this residence property. It is not an entirely effective screen, but would tend to reduce the prominence of the railroad.

Mr. Brown:

Q. At least it is satisfactory to the City?

A. It is the best we could do. I would like to introduce a resolution of the Board of Aldermen of the City of University City: "For your information, the following resolution was adopted by the Board of Aldermen at the regular meeting of March 22nd, 1921" (reads resolution marked "Exhibit No. 78").

Another resolution by same Board of Aldermen is read and marked "Exhibit No. 79."

Cross-examination postponed.

W. W. HORNER, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

My name is W. W. Horner; I am a civil engineer, graduate of Washington University; practiced my profession since 1905. I spent two years in waterworks construction, then remained until about four years ago in the sewer designing and construction department.

[fol. 209] Q. Have you made a study since you have been an engineer, an intense study on drainage?

A. About 1908, St. Louis City had some \$3,000,000 or \$4,000,000 worth of sewer and street construction; at that time I spent six months in complete review of all literature on rainfalls, and my report on that was made and filed.

I was in the sewer department and in charge of designing until 1914. At that time I was made engineer in charge of designing, and from the last three years have been chief engineer of streets and pavements.

I have contributed a number of technical subjects which were afterwards copied intact in the leading work on that subject.

Q. Have you made a study, first, to determine whether or not the sewerage or sewers can be reconstructed so as to take care of this rainfall under this plan as submitted by Mr. Bowen?

A. I have examined all of the sewers and have prepared a written memorandum. (Marked "Exhibit 80.")

Q. I think we can save time by furnishing the Commission with a written report on it, and then the other side can go into it for the purpose of cross-examination. It is so technical. Can it be done, Mr. Horner?

A. All existing sewers can be adapted to the proposed depression. The present plans of the proposed depression will require alterations in existing sewers adjacent to the Wabash tracks. First, the lowering of the arch of the Blackstone sewer in Union boulevard about 5 feet. These alterations will cost about \$11,000.

The lowering of the 20-inch cast-iron main which comes from the [fol. 210] pumps to the foul-water sewer near Lindell where it crosses the proposed depression east of Union; estimated cost of this work is about \$1,265.

Replacing present sewer crossing the Wabash tracks at alley north of Kingsbury with cast-iron pipe is estimated to cost \$780.

The reconstruction of present foul-water sewer in the alley south of Pershing avenue from Wabash right of way to Des Peres avenue, so that it will drain to the present River Des Peres foul-water sewer, is estimated will cost \$9,954. It can be done and the details of doing it and estimated cost are included in this written memorandum marked "Exhibit 80."

The total cost of that is \$53,000. The estimated cost of drainage lines in the cut between Kingshighway and Delmar boulevards is \$59,248. That does not include a piece on the north line of Delmar which will cost about \$3,300.

The cost of the 42-inch sewer, across Forest Park, is estimated at \$317,060.85. That is over to Tamm avenue. When the River Des Peres sewer is built, it will be a very easy matter to drain.

The plan of drainage of the River Des Peres has been under consideration for fifteen years, and in 1917 those plans were completed in the form of a general report, which was approved by the Board of Public Service. It is not complex at all. It is very simple. That report has been filed with the Board of Public Service. (Marked "Exhibit No. 81.") It is proposed to construct a closed sewer 32 feet in diameter across Delmar and into Washington Heights; then the sewer will follow the general course of the River Des Peres in Forest Park. The designing of these sewers is based on development of fifty years hence, and are designed to carry very [fol. 211] considerable more than the possible flood flow in 1915. We propose to take care of future development in that section.

Q. With the separation of grade crossing, what would be the situation? Have you prepared a plan of what would be necessary to be done for separation of grade?

A. I have prepared an analysis of conditions of the 1915 flood, and of the flow which occurred at that time. In preparing the analysis, we had very accurate measurements, and we have had available high water marks determining the flood stages throughout the River des Peres valley, and we were able to make close calculation of the amount of water, and determine approximately stages which would occur under certain conditions. Memorandum on that can be filed. (Marked "Exhibit No. 82.")

It involved bringing together considerable data, and in any analysis of that kind there is room for certain difference of opinion among engineers; but I believe anyone going over it again could not arrive at materially different conclusions. I think in some respects lower water stages than that we found, probably would be found. I am simply reproducing the rainfall and flood of 1915 with the change of channel.

Q. Assuming that the River Des Peres sewer is built, then what would be the probable drainage problem?

A. There would be no drainage problem then; it would be carried out. I have the plans for the necessary sewers; the first one I presented (Exhibit 80). The drainage of the Wabash cut can be carried from north of Delmar and south of Delmar in the proposed River Des Peres sewer; the remainder of the drainage could [fol. 212] well be carried to Union avenue, and from there through, short sewer to River Des Peres sewer.

I submitted plans for the proposed River Des Peres sewer on Union, and also plans for the proposed tunnel across Forest Park, to contractors to determine the cost; they have determined approximately the cost; that is contained in Exhibit 80.

Cross-examination postponed.

Mr. BOWEN recalled.

Questions by Mr. Daues:

I wish to submit Exhibit No. 83, a blue print showing the record of three test pits made along Wabash right of way between Union and De Baliviere avenue, to show character of the ground through which this cut would have to be made and the probable amount of seepage water to be encountered. This exhibit is in two sheets. One of these sheets is marked on the left, "Pit at Union avenue," and the other on the right, "Pit at De Baliviere avenue." In one of the columns is given the dates, next column the time of day, in the third column is given the height of seepage water, and the fourth column is given the rain-fall. A hole was dug right near Union boulevard, on the Wabash right of way, on September 20, 1916, and the rainfall in the seven days preceding the commencement of that excavation is given in column four as .11 inches. This hole was completed on September 23, and on that date five buckets of water had seeped into the hole. This was dug 18 feet deep, 5 feet deeper than the proposed cut of the Wabash grade at

[fol. 213] that point. That hole was allowed to stand from September 23, 1916, to November 16, 1916, at which time the depth of the seepage water was measured, and it amounted to 33 inches. That means that the height of the water got to a height of about 2 feet below point at which it is proposed to place the Wabash tracks in this cut.

We dug another pit at De Baliviere and Wabash tracks; started excavation on September 25, 1916, and completed it on September 28, 1916. These holes, by the way, were $3\frac{1}{2}$ feet wide and 7 feet long. This hole on De Baliviere was 23 feet deep, or 5 feet deeper than the elevation of the Wabash tracks at that point.

Notation of September 26th; two buckets of water seeped in, and on the 27th that two buckets of water seeped in, and on the 28th that four buckets of water seeped in. That hole was allowed to stand until November 13th, 1916, at which time there had accumulated in the hole 79 inches of water. That is also 9 inches above point where it was proposed to place Wabash tracks.

On September 18, 1917, we dug another pit $3\frac{1}{2}$ feet wide and 7 feet long, midway between De Baliviere and Union, and we carried that down to a depth of 20 feet, which is 4 feet below the proposed grade of the Wabash track at that point, and allowed that to stand until November 30, 1917. This pit was dug through cinder ballast on which the Rock Island Railway formerly maintained team tracks, and the earth taken out of the pit was thrown on this cinder ballast.

We had rainfall of 1.3 inches on the 27th of September, and as this hole was located at a point so it would drain the surrounding [fol. 214] territory, water went into the hole from the surface and filled up the hole to a total depth measured on February 14, 1918, of about seventeen feet; at which time it was filled up.

The conclusion is, the earth encountered all the way through these excavations was hard clay and the conclusion is that the amount of seepage water is very small and would not be anything serious to be encountered in the lowering of the tracks in that district.

Mr. Brown:

Q. These pits, were they dug to the level of the depression of the tracks, according to your present plan?

A. Yes, sir; the relation of the grades of the tracks to the bottom of those pits are always referring to present plans.

H. W. HAYES, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

My name is Henry W. Hays; I live in Allendon, Massachusetts, just outside of Boston.

Q. What official position do you hold under the Government?

A. Engineer of the Public Utilities. I am in charge of that

department. I have been engineer in that department and the Public Service Commission, which it succeeded, since 1914. I graduated in 1887 in civil engineering, and from that time until 1900 I was employed in the Boston Railroad, engineer in charge of construction, also maintenance of buildings and bridges. In 1900 and up to 1908 I was assistant chief engineer, and during that time I had a great deal to do with the elimination of grade crossings, [fol. 215] both as to designing and superintending construction and attended hearings. In 1905 I was appointed by the Attorney-General as engineer of grade crossings to attend hearings in the interest of grade-crossing elimination.

Q. You are now engaged as consulting engineer in this particular matter?

A. Yes, sir. I have gone over these plans of the City for the elimination of the grade crossings at Delmar boulevard. I have been in St. Louis before. I have heard the testimony of Mr. Bowen and these other gentlemen.

Q. Having had these plans before you, and having heard the testimony, have you reached a conclusion whether the City's plan of separations is practicable?

A. Entirely. I have examined quite carefully the plans; they have been very carefully worked out, and as far as I am able to view it, they are entirely practicable.

I have examined the Delmar grade crossings and gone over the whole plan which may be hereafter consummated, and I have the same answer to make to that.

Q. How would it affect the railroads, would it be practicable for them to operate?

A. Yes, sir; the change in grade is relatively slight. The increased cost of operation would be very insignificant, and there would be no difficulty in carrying out the plan. I could illustrate that by certain conclusions or plans which I prepared.

I think before I present blue prints, I had better make an explanation. The change in the railroad grade from the existing grade is summarized by statement that the net additional change [fol. 216] is 15.69 feet, distributed over a distance of about three miles. This would show an average change net rise and fall of about 5 feet per mile, which is small. Another way of testing the influence of the change in rise and fall is by determining the velocity or speed of trains operating over the distance in question. Westbound trains starting at Kingshighway and running westwardly and north, thirty miles an hour at Kingshighway, would reach Delmar, or point beyond Delmar, where change in grade ceases, at speed of twenty miles an hour, both under present and proposed plans and the greatest variation within this distance would be maximum speed under proposed plan of practically thirty-nine miles an hour; whereas, under present plans, it is 33.6 miles per hour, showing increased velocity of about five miles an hour.

Q. Going west?

A. Yes, sir. Going east and starting at Etzel, at thirty miles an hour under present grade, maximum speed would be 40.2 miles per

hour; under the proposed grade it would be 44.6 miles per hour; a net difference of 4.4 miles per hour. This is also shown by actual and virtual profiles prepared by me, which I will introduce.

City's Exhibit No. 84.

The Witness: This profile shows proposed alignment. The next line above, which is yellow, is the proposed change in grade. The white line, next above the yellow line, is the present grade; then immediately above that, in yellow and white, are the profiles; the yellow one with reference to proposed grade, and the one in white with reference to present grade.

The virtual profile is the one to be considered rather than the actual profile. The virtual profile is the actual profile modified to [fol. 217] include the different variations in velocity.

The result of the calculation indicated on the blue print shows the relative effort required by a locomotive in overcoming the present and proposed grades for trains traveling in the westbound direction, which is the most difficult direction, as the summit of the grade west of the St. Louis Terminal Railway is higher than the summit of the grade near Kingshighway.

The difference in the elevation of the virtual profile, present and proposed, shows the slight difference in effect of the proposed grade. That is, if a train starting at Vandeventer avenue, and acquiring a speed of 25 miles an hour or more near Talbot (Taylor) avenue, and eventually 35 miles an hour at a point near the Lindell drive, and continued the 35 miles per hour to a point near Delmar avenue, the virtual grade to the summit which is about two miles west of Delmar avenue, at an estimated speed of 20 miles an hour, the difference in locomotive effort to attain that speed at the summit is measured by the grade as shown, and on present profile would be equivalent to 6/10, and on the proposed to 5/10; that is on the assumption that the trains did not stop at Delmar avenue. With trains stopping at Delmar, present profile would be .79 with maximum of .9 on proposed profile.

Another test in the rise and fall of present and proposed grade is the estimated cost of the total additional for operating expense per annum. I estimate that the additional cost of this 15.69 feet of additional rise and fall is between \$80 and \$106 per annum. That, in my judgment is the difference.

[fol. 218] Mr. Bowen:

Q. How does the virtual grade between Kingshighway and Delmar, the proposed, compare with the present; does it make it better or worse?

A. Makes it a much better condition, with fewer breaks in the grade.

Mr. Bowen: The additional cost of operation is that caused by the depression south of Delmar or the track elevation north of Delmar?

A. Largely by the track elevation north of Delmar.

Commissioner Flad:

Q. Have you gone into the matter of run-off and capacity of the sewer?

A. No, I have not.

Cross-examination by Mr. Brown:

Q. Mr. Hayes, have you gone into the question of the separation of these grades on elevation plans, on earthen embankment?

A. Only considered it; I haven't seen any plans for it.

Q. Are you able to say from an engineering standpoint that it would be practicable to separate the grade by that method?

A. As far as construction goes, it is entirely practical.

Q. In your statement you said, I believe, that a train going west passing Kingshighway at speed of 30 miles per hour that the speed would be reduced to 20 miles per hour at some point north of Delmar?

A. Yes, sir; at the summit north of Delmar.

Q. Would the load behind that train have anything to do with that question?

A. Yes, it would. In my figures the load does not make any difference. I figured it would be necessary to go over the summit between ten and fifteen miles an hour.

Q. It is true, however, that a locomotive passing Kingshighway going west at 30 miles an hour, its speed may be reduced by this [fol. 219] grade depending on the load behind the locomotive?

A. Yes, sir. But the virtual profile shows that if the locomotive is able to overcome the maximum grade of 1 per cent, then it can overcome the grades as shown because none of the virtual profiles is one per cent.

Q. Did you take into consideration in that computation the slowing down and possible stopping of trains at the interlockers at Union and De Baliviere?

A. I have not shown that on here. That would affect it. This is on the theory with no stop required in one matter, and one in the other. I know that the interlockers are at De Baliviere and Union and they must be taken into account.

Q. You mentioned the stops at Delmar. Did you give the effect of that stop on the operation?

A. Yes, that is shown by the virtual profile. The effect of the stop at Delmar is similar to the stop at Vandeventer; that is, it would require an effort of the locomotive equivalent to climbing a 9/10 of 1 per cent grade to overcome that elevation of the track, which is something less than the ruling grades immediately north. The station at Vandeventer is not level, for a short distance, something like 400 feet is on slight-grade and steeper grade immediately east and west equivalent to about one per cent.

I said the average change in grade in the three-mile distance from Kingshighway to the north city limits is about fifteen feet, and from that I struck an average change of grade for that zone. It is true that the change of grade is not uniform for the zone all the

way through. I merely wanted to show the trivialness of the amount.

[fol. 220] Q. Isn't that misleading, unless you show the zone in which it is distributed?

A. It didn't seem so to me. You have 8/10 of 1 per cent grade west on the Wabash from De Baliviere. There is 8/10 of 1 per cent grade confined to that zone from De Baliviere to I think west of Etzel, a distance of practically a mile or two miles, a constantly ascending grade of 8/10 of 1 per cent there.

Mr. Ford (of counsel for Rock Island):

Q. Have you any knowledge of rise and fall being considered a practical method in dealing with problems of this character? Rise and fall is used generally, is it not, for comparison of proposed lines?

A. Yes, sir.

Q. Have you any knowledge of whether it has been considered as a practical method of comparison of operating costs to existing costs; the testimony you have given in connection with that is pretty largely theoretical, is it not?

A. Its foundation is theoretical; but I think it is practically true.

Q. Do you know of any case where it has been actually taken in any case?

A. No, it is so trivial, usually unimportant. It is, in my experience, in a great many grade crossing eliminations that the theoretical determination of their value or additional cost of operation has never been important. I am not familiar with the tonnage statistics of these lines.

Commissioner Flad:

Q. How could you get at the extra cost?

A. I used Wellington's Theory of the cost, average per foot of rise, which is based on the average cost per train-mile.

Q. Wouldn't that depend on the tonnage moved?

A. Yes, it is affected by irregularity of track and all sorts of [fol. 221] things. I am not familiar with Raymond's theory. I would be surprised if there was a difference of 100 per cent.

Mr. Brown:

Q. Mr. Hayes, on trains going west on the Wabash, stopping at Delmar, they would be compelled to stop on grade of 8/10 of 1 per cent?

A. Yes, sir.

Q. In that respect the situation is different from train stopping at Vandeventer, because at Vandeventer they have practically a level grade for their start westbound?

A. I don't consider it practically level grade. Immediately in front of the station it is .56, and 100 feet east it is .27; next 100 feet it is .59, next .94, next 1.1, and next 1.2 per cent.

West first 100 feet it is .79, second is .95, next .97, next .93, next .96, next 1.08, then 1.04. I consider it is better railroad operation to start a train on a level.

Mr. Ford:

Q. Have you gone into the trackage statistics to know the length of those trains that are operated over these grades?

A. No, sir.

Q. So that if the train stopped on two or three sections of grade, you have not examined it at all what the effect would be?

A. No, sir; I have not. I have been entirely in the engineering department.

Mr. Daues:

Q. Your conclusion is that the cost of the new plan over the old or present plan is very insignificant?

A. Yes, sir. I have heard Mr. Bowen's testimony and his explanation of what was contained in the schedules of these railroads, running six freight trains a day, and the number of passenger trains, fifteen a day, is very light operation; it is to be considered light, not heavy traffic. It is my best judgment that the difference in cost is very slight.

[fol. 222] An adjournment was taken until 2 o'clock, at which time, March 24th, 2 p. m., hearing was resumed.

LOX O. HOCKER, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

My name is Lon O. Hocker. I have a license to practice law. I reside in the City of St. Louis. I own property at 39 Portland place; it is two hundred or three hundred feet east of Union avenue, north of that intersection.

I have heard the plan of the City discussed in a general way for the elimination of the grade crossing at Delmar boulevard.

Q. It is proposed or suggested that the grade be changed by the elevation of the street as shown by the exhibits before you, and if this plan is carried through, together with the grade crossings at Union, De Baliviere and others, it would call for a depression of the railroad tracks. There is another method of separation of these grade crossings, and that is by elevation of the railroad tracks over and above the streets. I ask you as a property owner, whether in your judgment the elevation of the tracks would be ruinous to that locality?

A. I think it would be very harmful to the park and to the surrounding country, which is perhaps the better part of St. Louis. It would have a depressing effect on the real estate adjacent to that

road. I think if the tracks were depressed, it would be a better solution.

[fol. 223] Cross-examination by Mr. Brown:

Q. What are your reasons for the conclusion just stated?

A. Any superstructure built through a neighborhood of that kind, such as is habitually used by railroads, is unsightly and is marring of the landscape. I am very familiar with the Wabash track through Forest Park; it is elevated on an embankment. In my opinion it has very much retarded the property on Lindell drive. I had in mind buying some property near Union avenue, and on account of the fact that we had that grade crossing there, I lost all interest in it.

Q. That property is all built up through there now, isn't it?

A. Well, substantially few pieces of vacant property there.

Q. What class of houses are built in there?

A. Residential property, high class, among the finest in the City.

Q. They have built in there in the last twenty-five years?

A. I would say in the last fifteen years.

Q. Really, the residences along the north side of Lindell drive are as fine as any in Portland place?

A. Yes, especially at the eastern end. I would not say on the western end where the proximity of the railroad is.

Q. The elevated structure is nearer the residences on the eastern end than it would be to your place in Portland place?

A. Yes, sir; it is nearer.

Q. So that if the destroying effect of the railroad tracks being on an embankment will apply in one place, it should apply in the other?

A. I would not say so, because as far as this residential property is concerned, the Wabash borders over to the south in the park, and [fol. 224] you are compelled to landscape it there, which you can't do at a street crossing. When you have a grade-elevated crossing at Union avenue, your opportunity for landscaping is lost.

Q. What are the opportunities for landscaping a 22-foot ditch?

A. You can overlook a ditch; it does not affect the skyline like a superstructure. I am familiar with the residential district north of Delmar and east of the Wabash tracks in through there. Between Hamilton and east of the Wabash tracks on the north of Delmar is what would be regarded as high-class residence district.

I don't think the same objections, I am arguing as to the south of Delmar, would apply equally as strong north of Delmar. You take that street which is right east of the Wabash tracks, Hodiament; that is a sort of wagon road, used for hauling sand and concreting, and that is more or less of a business district right there.

Q. You understand that the City's plan calls for improvement of Hodiament?

A. I didn't know that. I am glad to know it. But there is no comparison of Hodiament with Forest Park and Lindell and Union. I am familiar with the district through which the Wabash passes between Delmar and Union. That district has been built largely within the last fifteen years. It is of medium priced residences,

apartments and flats. I would not say, taking it as a whole, that district between Delmar on the north and Union on the south is not as high a class residence district as the one between Hamilton and the Wabash tracks, just north of Delmar. Outside of the fact that there are a great many more apartment houses in the district last mentioned, I would say they are of the same class. The character of the improvements in one district is the same as the other.

My opinion is based entirely upon the esthetic point of view, not on any opinion of legal damages. I consider that one of the beauty spots, and the park right there, and everything ought to be done to conserve it. My property is six or seven hundred feet from the Wabash tracks. I imagine at this time of the year I might see a train if I looked for it. It don't affect me.

Q. Your Portland place is parked in front with trees?

A. I am just thinking of the general locality.

Q. If the track elevation plan could be treated with nice, ornamental structure, wouldn't that change your opinion as compared with the depressed track?

A. I have never seen it done. You take in Chicago, there is not a more unsightly part of Chicago than where the trains come in east into Chicago; and that is what I am afraid you will have here. There is no effort made to beautify them.

Q. The places you mean in Chicago were not even attempted to be treated esthetically?

A. No, sir; if they did, they did not succeed very well. I think the Wabash Bridge, over Grand drive, is all right.

Q. A structure like that would not damage your property?

A. I am not here to say that it damages my property. I am here to say that it damages the neighborhood and the City. I think it would be better if you could obscure the railroad, than to make it more prominent.

I am familiar with the River Des Peres. I do not regard these channels as constituting an esthetic sight; quite the contrary.

Q. Well, that is what the cut would be if you had the depressed tracks?

A. Minus the odors. You would not necessarily have to have the [fol. 226] odors; you could build up a little grass along the sides. I don't see how you can avoid the grade crossing at Union; the one that is there now is not such an eyesore, but when you build it up some considerable distance, in order to have an overhead crossing, it would be quite different than what it is now.

Notwithstanding the fact that the embankment might be sodded with shrubbery, a string of freight cars running along there would be a very unsightly thing.

Mr. Rodehaver:

Q. Have you ever traveled over the Pennsylvania, east of Harrisburg?

A. Yes, sir. I think around close to Philadelphia they seem to landscape their cuts. I think that could be done here.

EDWARD B. PRYOR, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

My name is Edward B. Pryor; I reside at 5257 Lindell boulevard. I have lived in St. Louis forty-five years. I am the same Mr. Pryor who was at one time receiver of the Wabash. I own the property described as my home.

I am not familiar with the present plan submitted by the City for the suppression of the Wabash tracks; I have not seen them.

Q. Have you ever considered or given study to the problem of separation of grade crossing of the Wabash at Delmar boulevard?

A. I did when I was receiver for the Wabash. I came to the conclusion that the Wabash tracks could be slightly depressed and a [fol. 227] viaduct constructed over the tracks, commencing a little west of Hamilton avenue on the east and extending over the tracks to the west of Rosedale avenue. I am still of the opinion that the same plan would be practicable and proper. I do think the elevation of the Wabash tracks would be a serious damage to the property and the esthetic view of the entire Forest Park.

Cross-examination by Mr. Brown:

Q. Were you present when Mr. Hocker testified?

A. No, sir. When I speak of property being damaged by elevating the tracks, I mean that to change the tracks as they are now and raising the grade on either an embankment or viaduct would seriously affect the values of property there. If I could just state the case in my own way, I could make myself clear. Going back to the time of the receivership. When the receiver had charge of the Wabash property, Judge Adams, United States Circuit Judge, kept after us, Mr. Bixby and myself, to do something about separating the grades in St. Louis. I suppose he spoke to me dozens of times about it, and when the matter came up under Mayor Kreismann's administration, the three receivers had several meetings with the Mayor and his Commissioner; Dwight Davis was Park Commissioner at that time, and then we met three members of the City Council, and we finally agreed upon this plan of depressing the Wabash tracks about two feet, and the construction of a viaduct, and we practically agreed upon the terms and everything else. [fol. 228] We agreed that we would pay \$120,000, is my recollection, towards the cost of construction of the viaduct; and we presumed that was going through.

When the ordinance was drawn up, they tacked on another clause representing the River Des Peres. They tacked on that clause and they assessed us \$20,000 to \$25,000 for the cost of straightening out the River Des Peres, and we would not agree to that, so the ordinance was never accepted.

Q. Was the matter ever presented to Judge Adams, do you know?

A. No, not officially. And our chief engineer, Mr. Cunningham, objected to that plan then; he had objected all the time to the de-

pressing of the the track through Forest Park. At that time the grade separation plan of Delmar was not actively pressed, but the separation at Delmar more or less controlled the whole scheme.

That was the initial step at Delmar, then on down to Forest Park; Mr. Cunningham had drawn plans, but the great objection was that if they depressed too much, they would get us below water level.

Mr. Daues:

Q. Mr. Cunningham then, as now, objected to everything?

A. Yes, they were opposed to doing anything. That was the feeling just then; didn't want to spend the money.

I want to say in this connection that I bought ground and built my home out there; I don't think it is more than 100 or 150 feet from the Wabash tracks as they are now located. I didn't object to the trains in the least. The depression of the tracks would add to the beauty of the park. I think an embankment going up ten feet further would damage my property seriously, and all the property adjoining. It was the idea of the operating department to do nothing.

[fol. 229] Q. At that time you were the boss?

A. My policy was to depress, and I think Mr. Delrose (Delano) and Mr. Bixby both agreed with me. This initial step was blocked by the City. We would have gone ahead and finished it if the City had not stepped in and added a clause in the ordinance to make us pay an additional \$25,000.

Q. Your desire to carry out the grade separation was blocked by the sum of \$25,000?

A. It was blocked by the added clause that had nothing to do with the grade separation.

At this point a recess was taken.

Mr. Burns: The Chicago, Rock Island & Pacific Railway Company was made a party to proceedings and on March 17th a supplement to amended complaint was filed, stating in substance that if grade crossing of the Wabash at Delmar boulevard is abolished in manner prayed for, any future order of this Commission to abolish grade crossings of the Wabash at or near Lindell will necessitate the depression of the Wabash tracks and right of way of defendant Chicago, Rock Island & Pacific Railway Company at Lindell boulevard and for some distance eastwardly.

This presents a situation that while the Chicago, Rock Island & Pacific is not interested in the Delmar grade separation, it is vitally interested in any future change of grade that may be made south of there, especially in the vicinity of the north line of Forest Park.

The Rock Island is a trunk line of some 8,000 miles, extending from Chicago to St. Louis as terminal points, to the Pacific Coast and points in Texas, Colorado and throughout states west of Missouri. [fol. 230] runs its train through from St. Louis to Los Angeles and from Chicago through Nebraska same way; sleepers run through without change to California; it transports large quantities of freight and numbers of passengers, also United States mail, between the

states. St. Louis is vitally interested in building up the Rock Island; we want to work with all the cities with which we connect and through which we run.

We think it only fair that the Commission have before it the entire plan of the City; the City says this plan of separation of grades would naturally result in depression of Rock Island tracks if necessary to change grade south of the Delmar proposition.

Our engineers have looked into this proposition and are very much afraid of water from River des Peres getting into that cut, if that should be done. They think some other plan might be more feasible. We should look into the future; if as they say this is the key to the situation, they should look into the entire plan to see if it is feasible.

The Rock Island has spent a great deal of money getting into St. Louis, has acquired a valuable right of way through the West End into Forest Park, and it is to the interest of St. Louis to see that those rights are preserved. If this is the only feasible plan the Rock Island has to get into the City of St. Louis, it would be a great travesty of justice for any commission to force us to abandon that right of way for which we have expended a great deal of money.

It has been stated here that the Rock Island has been in sympathy with this plan; that cannot be said at this time. It may be said the Rock Island is willing to help the City, but the City should not [fol. 231] place the Rock Island in the attitude of forcing it to abandon the right of way it has had for years. The Rock Island helped to upbuild St. Louis. I know no one feels it should be forced to seek another entrance into the city.

We have this entrance and it is a property right guaranteed by the Constitution of the State of Missouri and of the United States; unless we get something else not too expensive, we must insist upon this just as though there were no other.

No one knows the future, therefore we must ask that the Commission look into this entire plan and give it most careful consideration, assuming this is the only entrance we have into the City of St. Louis.

Mr. Gerhart: The Rock Island in August, 1875, under the tripartite agreement, had the right of way given through Forest Park to the end of the Wabash Railroad; that was upheld by the courts.

We know the Rock Island enters the City of St. Louis about 650 feet west of Skinker road; the City has no jurisdiction beyond that, but your Commission has. The question of water in the River des Peres is one of dollars and cents. It is perfectly feasible to eliminate that water through a public sewer.

WILLIAM E. GUY, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

My name is William E. Guy. I live at 10 Portland place. I have lived in St. Louis since 1872, except for a few years that I was traveling. I was an active engineer. I laid out and built the St.

Louis, Peoria & Northern Railroad in connection with the Mer-[fol. 232] chants Bridge through East St. Louis up to Peoria and was engaged in building up to Clinion when that was bought out by a Chicago syndicate. Afterwards I built the Valley Railroad, which now runs down to Thebes to bunch of coal mines; and also at the same time I was engaged in rebuilding the St. Louis & — Railroad near Cape Girardeau, a system of about 265 miles. It was the Hauck system.

I own my place in Portland place. I am familiar with the proposed plan of separation of grade at Delmar by elevation of the street over the railroad tracks. I have heard the plans discussed on depression of the railroad tracks. I have also heard it suggested that the separation of grade be had by elevation of the tracks.

I think the elevation of the railroad tracks on an embankment would have a very damaging effect on the property all along there, and I think it is more dangerous, being up in the air and the noise and everything. I have discussed this with my neighbors who live and own property in the neighborhood. It is the unanimous opinion among property owners in that neighborhood that the elevation of the railroad would destroy the beauty of that neighborhood. It is considered very objectionable.

The depressed plan seems to be the best solution from the esthetic point of view. It would be very objectionable, taking cognizance of the park being right there, to putting the railroad up on a hill.

Cross-examination by Mr. Brown:

Q. Do you think the people who live in Portland place are more es-[fol. 233] thetic than the people who live north of Delmar boulevard?

A. No, I didn't say that.

Mr. Brown: The reason I ask that, the City asks us to elevate the railroad tracks north of Delmar, and the people who live in that district would have to look out upon this elevated structure, and I was just wondering ifn't it just——

A. There are certain compelling reasons for that. North of Delmar they happen to have certain coal yards; I don't see any reason when some persons have to submit for the general good to certain inconveniences or eyesores, why all should do so, especially so near the park.

Q. Are you familiar with the depression out at Tower Grove?

A. Yes, sir. All those industries out there had to reconstruct their industrial tracks and depress them.

Q. The same could be done out here north of Delmar, that is true.

A. I don't see that that argument applies to what they do south of Delmar.

Q. I agree with you on the question of damage to the property by this elevated structure, that would be just the same as if your property was damaged by a neighbor building an unsightly fence.

A. Yes, sir. You put a railroad right under a window close by, it would not affect us, but those apartment houses, there is a material damage not merely an esthetic damage. You can see that this prop-

erty would not rent for nearly as much as they are now. That would be true of all railroads, but if they are put below there, there would be still less damage; there would not be the same objections; and they would not have the same noise. In New York they have the elevated and the subways; the elevated railroads are a great damage of course to the property. Yes, they are regarded as a necessity, but [fol. 234] they put them underneath wherever they can. That would be an ideal was to put the railroad, so far as the City is concerned, out of sight.

Q. Same esthetic reason that would call for depression of the railroad in St. Louis would be the same in other towns?

A. Yes, sir.

In my judgment the market value of that high class property would greatly depreciate if those tracks were elevated, there is no question of that.

Q. You don't deny the railroad as property owner the right to build its own kind of structure on its own property, do you?

A. Where it is not modified by other things. When a railroad goes through a town they assume certain liabilities. It is not like out in the country. When they get into a town, or even after they have been in a town a long time, and the town grows, then the railroad has to modify and give up certain parts of its rights. It would not be a good thing to keep them out of the City, but keep them out of sight. If you buy a lot you haven't the right to put any kind of building you choose there if that is restricted.

Q. You have all the rights the law entitles you to?

A. Yes, sir.

Q. You would not allow your neighbor to define those rights, to dictate to you the kind of structure you should build, so long as you conformed to the laws regulating that kind of building?

A. As a good citizen and as a good neighbor I would try to assert my rights or give up some of my rights if it offended him. Having been a railroad man, I realize that it is perfectly proper for railroad men to fight all they can.

[fol. 235] E. D. NIMBS, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

My name is E. D. Nimbs; I am president of the Southwestern Bell Telephone Company. I live at 56 Portland place. I own that property; it is my home. It is a block and a half from the Wabash tracks. I am familiar with these different plans discussed with regard to the separation of grade at Delmar boulevard and the grade crossings south of that.

Q. One plan calls for the elevation of the tracks over the streets and the other for depression of the tracks under the streets. Which, in your judgment, would be less damaging to the property in that neighborhood?

A. It would be least damaging to have the tracks depressed. I

think the property there is of the highest class residence property in St. Louis. An elevated structure over a trestle or earthen embankment would cause serious damage to that neighborhood. It would destroy in a great measure the beauty of Forest Park.

Q. What is the feeling among property owners with reference to these plans?

A. I never heard any opinion expressed except that it would be very damaging if the tracks were elevated; they oppose, as property holders there, any elevation of those railroad tracks.

Cross-examination by Mr. Brown:

I live in Portland place. I am familiar with the residential dis-[fol. 236] trict on the north side of Lindell between Kingshighway and Union; that is a high residential section, too; similar to Portland place.

Q. The Wabash Railroad as now constructed is on an elevation through Forest Park. The elevation begins just after it crosses Lindell drive going to the south, and goes under Kingshighway?

A. Yes, sir. I am familiar with that.

Q. That road was built in 1875 or soon afterwards. That entire residential district along Lindell drive has been built up since that road was constructed through the park; that is true?

A. I think probably most of it.

Q. And even within very recent years our friend, Mr. Pryor, has gone down there near the Wabash tracks and bought a very handsome residence where he could see the trains go by?

A. Yes, sir.

Q. It must be true, then, that the construction of the Wabash Railroad through the park did not retard or destroy the residential section on the north side of Lindell, did it?

A. I have no doubt it did destroy it to a large extent, and retard it—the growth and values of it. It probably did not destroy the property in Portland place so much. Some of us purchased in there with the hopes that the tracks would be taken away entirely.

Q. That is what you would like to see done. You take the present track through Forest Park, take it off of the embankment and put it into a ditch 18 to 20 feet deep; which do you think would be the more unsightly, the ditch or the railroad embankment?

A. That would be rather a hard question to answer. It probably could be put through Forest Park in a tunnel, and it would be better.

Mr. Daues objects to the word "ditch."

[fol. 237] Mr. Brown:

Q. If you were to say I will put it in the ditch or I will leave it on the present embankment, what would you say about it?

A. I think that would depend entirely on the topography of the land.

Q. Take Forest Park just as it is there. The City intends, as I understand it, to dig a ditch through the park where it crosses Lindell avenue, west of the present crossing, and run it clear through

the park to the east line of the park, and they propose to let the railroad track in that ditch; then, on each side of the ditch they propose to throw up a high embankment, so you will have two embankments and a ditch where you now have one embankment, and that is the condition you now have in Forest Park. What is your view from an esthetic standpoint?

A. I have seen the plan they propose there, and it would seem to me that the proposed plan to depress the tracks would be very much better than to elevate them. There is an objection to an embankment. To depress the tracks would be much less objectionable than the other way. I am familiar with the River des Peres. I have seen the channel and seen that district up to Delmar. I regard the channel of that river as an unsightly thing. I don't think there is any question but that the elevated railroad would be very much more unsightly in every way, and very much more damaging to surrounding property. I think there are a number of things which damage the property; noise for one, more with an elevated track than if it were depressed.

Q. Do you think there would be more smoke on the ground with the train running in the ditch than there would be if the train [fol. 238] was carried up 20 feet on an embankment?

A. I don't know that I am competent to answer that. I imagine there would be.

Mr. Daues:

Mr. Brown asked you if the property on the north side of Lindell boulevard had become improved notwithstanding the presence of the Walash tracks there. There is quite a distance between those tracks and your property?

A. Yes, sir.

Q. This so-called "ditch" through Forest Park—if it were shown that the tracks were to be depressed and the sides sloped down to the tracks and sodded by the Forest Park landscape artist, and to be crossed by a viaduct for vehicular traffic, and to be spanned by foot bridges artistically made, would you say that would be an improvement over an elevated structure?

A. Yes, sir.

FRANK H. GERHART, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

My name is Frank H. Gerhart; I live at 4900 Lindell; I bought that property eighteen years ago. My brother and myself own quite a tract of land on Pershing through to Waterman, fronting 369 feet on De Baliviere and 150 feet on Pershing and Waterman. It is half a block from the Rock Island. I have heard what you intend doing and am familiar with this proposed line of depression and with the suggestion that the tracks might be elevated.

I am a real estate man and have had forty-three years' active experience; I handled that property out there for the last forty years. I am familiar with the elements that go into property values and [fol. 239] damages.

Q. I ask you whether, in your opinion, the elevation of those tracks would seriously damage property values in that section?

A. I think it would amount to almost confiscating the property. Where the track runs through the park from Union boulevard eastwardly the view would be cut off if the tracks were elevated. As you go eastwardly the topography of the park drops southwardly and you have a view of that portion of the park.

Q. If that track was elevated that view would be cut off and it would destroy the magnificent scenic effect and also affect the value of the park as well as the property adjacent to the park?

A. It would disgrace the entire district in the first place; and, second, I think it would be an unpardonable error on the part of the railroads if they would allow such a thing to be done. I am of the opinion that the grades should be separated and that the tracks should be depressed.

Cross-examination declined.

JOHN P. WOODS, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

My name is John P. Woods; I am treasurer of the John V. Kupferle Foundry Company. I reside at the corner of Union avenue and Park road, 5294 Lindell boulevard.

Q. That is the property we are talking about being so close to Union and Wabash tracks?

A. There is no other property closer than mine. That is my [fol. 240] own property. I am vitally, but not selfishly, interested in this proposition.

I have heard the City give its testimony as to the plan of separation of those grades beginning at Delmar and coming out along the Wabash tracks to Forest Park. I know it is proposed by the City that the Commission will order the grade crossings separated by depression of the railroad tracks; in my opinion it is absolutely the proper way to do it. I would call it a crime against nature to elevate the railroad on an embankment or on trestles. It would damage my property, it would murder the park. The property owners in the neighborhood are loud in their objection.

Q. You own property next to Mr. Pryor?

A. No, sir; that property can't be sold. I have tried for five years to buy the corner, figuring that the Wabash would be a friend to St. Louis and give up the track across the grade there. I don't know how many feet I am from the track. I am close enough. Immediately south of Lindell the track begins to elevate on an

embankment through the park. It has always been that way since I know it. It was an eyesore to me when I lived on Lake avenue. I regard that as being absolutely inexcusable.

Cross-examination by Mr. Hall:

Q. Did you ever know that the Park Commissioners were responsible for the road being built on that grade?

A. It is there, and that is my opinion of it as I have expressed it.

Q. You would prefer to have the track in a ditch through the [fol. 211] park?

A. If you will determine what a ditch is, I will answer.

Q. Mr. Daues calls it a "depression."

A. I prefer the depression.

Q. A canal eighteen feet deep, if we excavate that ditch and put the tracks in there, you think that would be preferable to the way they are at present?

A. I can't imagine an attitude of a public carrier who came to this city and run through God's country for forty years, always looking for favor from St. Louis, who would fight civic pride. I regard it as nearly criminal to do so. I think if the tracks were put down through Forest Park it would be preferable to the present location. That is true so far as my judgment goes, north of Lindell.

I understand the City proposes to elevate the street in front of my property and carry the street over this excavation; I think that is preferable to having the tracks, decidedly so. One of my objection is from an esthetic point of view, the other that the City might be materially benefited by a correction of the imposition as it is now.

Q. If we looked entirely to the benefits of the City, it would be preferable if the railroad were put in a tunnel?

A. The further from sight, the better.

Q. A railroad in the city is a great deal like a smokestack from an industry?

A. It is worse; you can control the smoke. There is also the hazard of life to be considered in grade crossings.

Q. We are discussing the question of whether the separation of grade should be by elevation or by depression; my question is whether your objection is not the common objection that is true of [fol. 212] any industry that operates in a city—there is noise and there is smoke?

A. That is a factor, yes. I suppose any city would be much more sightly if it had no industries and no railroads in sight; the perspective view might be better. They must have industries and railroads, if they treat the city right; they must have the necessary understanding that come with the operation of industries and the operation of railroads.

Dr. SAMUEL J. KEIFFER, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

My name is Samuel J. Keiffer; I reside at 5918 De Giverville. I own that property and have lived there two years. I am a pharmacist, connected with the Keiffer Drug Company. I am at the head of the company.

I have, in a general way, studied the plan of separation of the grade—railroad and streets. We are on the "banks of the Wabash," back end.

If they were to elevate the railroad, I think it would make the next negro settlement right around where I live. I say the elevation of the tracks would seriously decrease the market value of property there, from 65 to 85 per cent. I think that is true of adjacent property. I can only view it from the angle that I see it.

I am absolutely of the opinion that the grade should be separated. I should prefer to have the tracks depressed, particularly in this instance.

Q. What effect in your judgment would the elevation of the tracks have in Forest Park?

[fol 243] A. So great I don't think any man could estimate what it would do to Forest Park. It would be so deteriorating I don't think there is a man here could estimate the damage.

Q. You don't think there is an honest difference of opinion in this proposition at all?

A. No, I don't think so. I have had the opinion that this elevating scheme is merely proposed as a stumbling block to separation of grade, but would not state it positively. I believe that the elevation of the railroad tracks would be infinitely more damaging than the depression of the tracks. My property is adjoining the tracks.

Cross-examination by Mr. Brown:

Q. On which side of the Wabash track do you live, Doctor?

A. It is an angle there, on the north side, I should say. The tracks are in a cut there. It is difficult to estimate the depth of the cut there. I should say 10 or 12 feet. I never heard the cut called "Tin Can Alley" it might be.

I do not know that on both sides of the cut the residents dump their ashes there. I have walked up and down that cut, but there is an alley of some 15 feet there. Part of the way there is an alley. That cut there isn't a beautiful thing. The plan laid out by the city is much preferred. I would say it is a monetary consideration. It is my home and to me it is just as much as though it was on Lindell boulevard. Then from the standpoint of noise and smoke. If they would raise the railroad tracks I could not estimate what the damage would be. The trains as they come along there now are approximately at grade. We always have some smoke; no trouble with [fol 244] cinders. Mine is the 4th house from Hamilton, west, where the Wabash crosses Hamilton. It is exactly the 4th house; it isn't a fourth of a block.

C. H. RODEHAVER, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

I live at 5908 De Giverville. I own that property; I am also president of the West End Grade Crossing Association. The citizens and property owners in that neighborhood have organized for the purpose of eliminating grade crossings. The purpose of the organization is to oppose the elevation of the Wabash tracks and to support the City in its plan. That is my view and that of every member of the organization.

Q. How many members have you?

A. One hundred fifty property owners, I would say, immediately adjoining the Wabash right of way.

I have been present at the hearing and have heard the City make its proposition and I concur.

Q. What effect would it have on Forest Park if the tracks were elevated?

A. My opinion is the same as the previous witness, that it would be very damaging. The Association has a petition they have prepared, signed by property owners along the Wabash right of way, in which they say they are opposed to the elevation of those tracks; that petition was signed principally by every person in my presence.

Petition is marked Exhibit No. 85.

Cross-examination declined.

[fol. 245] J. J. MILLER, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

My name is J. J. Miller; I reside at 5277 Lindell. I own that property; that is my home; I live there with my family. I am vice-president of the Millner Electric Co.

I think the elevation of these tracks would be very damaging to the property. I think it would diminish the market value of that property. I think it would destroy the beauty of the park. I favor the separation of the grade crossings. I think the City's is the proper plan.

Cross-examination by Mr. Brown:

Q. You live at 5277 Lindell?

A. Yes, sir. It is the next house west of Mr. Pryor's.

Q. Almost immediately south of your residence as you look across the park, the tracks are laid on an embankment?

A. Not just south, a little east. They begin south of my residence. On an embankment through the park.

Q. Does that condition present an unsightly view from your front porch?

A. It is not the best looking sight we have from the front porch. It is hardly objectionable as it is now.

Mr. Daues:

Q. When did you buy this property?

A. Two years ago. There is a clause in my deed that if the tracks are elevated, I can turn it back.

[fol. 246] C. K. REIFSNIDER, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

My name is C. K. Reifsnider. I reside at 5249 Lindell. That is my home and I own the property. It is my residence. I have heard the plans discussed here.

Q. What do you think of the elevation of the Wabash tracks?

A. I think it would be a crime against the City and all the property in that section, and in violation of the agreement between the road and the residents in that part of the City that was in effect before I bought that property fourteen years ago. That is a contract between the railroad and somebody for the City, it was on file here in the City Hall.

Q. You refer to the old tripartite agreement or some subsequent agreement?

A. I don't know, it was here, and it was one of the things that caused me to buy that property. I would consider the elevation of these tracks absolutely destructive. The depression plan would be very much better than the present. Less dangerous to human life. By all means the tracks should be depressed.

Cross-examination by Mr. Brown:

Q. If your judgment based merely on the outlook?

A. No, from every feature, as it is, as it was and as it would be. I look out at the track from the front window. I built there in 1911.

Q. Has that outlook ever struck you as being an eye-sore?

A. It certainly was and it certainly would be better if it were [fol. 247] down. I bought the property on the assurance that the tracks would be sunk. There was a plat shown to me at the time. I don't know who showed it to me. It was an agreement between the road and some of the authorities. I haven't seen the thing since that time. It was shown to me in the real estate office.

W. F. BLANKE, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

My name is W. F. Blanke; I reside at 5215 Lindell; that is my own home. My business, the W. F. Blanke Candy Manufacturing

Co. I heard the discussion of the separation of grades. The elevation of the Wabash tracks would decrease the value of the property and I would move out of the neighborhood. It would ruin that whole end of the park. The plan to depress the tracks is the only way.

Cross-examination by Mr. Brown:

Q. How long have you lived there?

A. About six years. I don't know how far my residence is from the railway where it crosses Lindell drive or Grand drive; I guess about a block—300 or 400 feet. That railroad is built on quite a high embankment at that point. It obstructs my view. I prefer not to have it there. My neighbor's house does not obstruct my view.

Q. Has it ever appealed to you to be objectionable so far as your [fol. 248] property is concerned, the fact that 300 or 400 feet away a railroad is on an embankment?

A. Yes, sir.

Q. Has it ever appealed to you that the northeast corner or section of Forest Park is destroyed?

A. Destroyed by what?

Q. That is a pretty picturesque portion of the park, isn't it?

A. Yes, sir. It would be much prettier without the railroad tracks on an embankment there.

ROBERT McK. JONES, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

My name is Robert McK. Jones. I have retired from business. I reside at 6 Westmoreland place. That is my property—my residence.

I have heard in a general way of the separation of grade crossing of the Wabash tracks and Delmar boulevard, and other streets south of Delmar. It is my opinion that the elevation of the tracks of the Wabash would be very objectionable. It would unquestionably affect the market value of the real estate there.

I am heartily in favor of the plan as proposed by the City of depressing the railroad tracks and carrying the streets over them. I was promised during the World's Fair that the tracks would be depressed.

Q. That seems to be the opinion of all those who live out there, that the tracks would be depressed?

A. Yes, sir. That is the reason I volunteered to come here to testify.

[fol. 249] Cross-examination by Mr. Brown:

Q. Have you ever seen the City's plans?

A. I saw pictures of them in the newspapers.

Q. What is your understanding of the method by which they are to run the railroad tracks through Forest Park?

A. To depress the tracks, as I understand it, from Delmar boulevard east through the park.

Q. Do you understand that they are to build an embankment on each side of that depression?

A. I have not seen the present plans recently.

Q. That is what the City intends to do, to dig a "ditch," as we call it, on this side, and Mr. Daues calls it a "depression"; they are to throw an embankment on each side?

A. Yes. I understood that trees were to be placed on each side. I think the City embankment would be more slightly than the present embankment.

Mr. Daues:

Q. These are catchy questions. The City intends to depress the tracks and then have a sloped elevation of ground on either side so as to cut out the unsightly view of the railroad, and to keep the water out of this depression.

A. That is my understanding. I say unquestionably that the plan as proposed by the City is the proper plan.

ERNEST J. RUSSELL, being duly sworn, testified as follows:

Direct examination by W^r. Daues:

My name is Ernest J. Russell; I reside at 5814 Capanne. I am an architect. I am chairman of the City Plan Commission. Its [fol. 250] duties are to consider the problems of the City and to try to regulate the growth in an orderly manner. We have in mind the beautifying the City. I am head of Mauran, Russell & Crowell.

Q. Have you, with the City Plan Commission, studied the proposed plan of the City which has for its purpose the separation of grade of the Wabash tracks and Delmar boulevard, and if the plans are carried to completion, the separation of grades of streets and Wabash tracks to the south?

A. I have examined them. The Commission has never considered the possibility of raising the tracks; it has always taken the position that the tracks should be depressed.

Q. It was so repugnant to your judgment that it was never even considered by your Commission?

A. Yes, sir. I do not think from our standpoint the question is really debatable. We believe in the depression plan and believe it should be adopted. The City Plan Commission has had in mind that this section under consideration is recognized as the best residence section in the City and connecting with the best residence section in the county. Lindell and Delmar are the two thoroughfares leading to that section. Some time ago we had up the question of evasion of that section with a commercial building and the

sentiment against it was overwhelming; it showed the citizens had pride in that section. That matter was taken up as far east as 4300 and very much farther west. The farther west you go the more objectionable. Delmar boulevard is almost as important because it is the only other through stream; we have tried not to spoil the [fol. 251] impressiveness of that boulevard. I do not heartily endorse the separation of the grade "in some manner." I endorse the separation of the grade with the depression of the railroad tracks. I have been consulted by the City Engineer with reference to this matter and I concurred in the plan.

Cross-examination by Mr. Brown:

Q. Has your study of this situation been confined to the viewpoint of an architect?

A. No; from the viewpoint of City planning. I don't mean to say that I have ignored the fact that I have architectural training. My preference for the depression is because it puts the railroads out of view. My conclusion is based on the fact that the railroads would be practically hidden. If that plan could be accomplished it would please the City Plan Commission and I think the citizens generally. I have not gone into the cost of the two plans in detail of the cost of the railroads.

Mr. Daues:

Q. What is the esthetic effect of railroad elevation as contradistinct from depression?

A. The City Plan Commission has not gone into that, but it thought the City should have something it could take pride in; the City is entitled to put on its best clothes to make an impression on citizens and visitors, just as you and I have a chance to select our clothes. While I have not made a study of this particular transaction, I am forced to the opinion that it would ruin Forest Park if the tracks were elevated. That is true as to the elevation north of Forest Park. We have studied the plan of the intersection of Union and Lindell. I think it would be an asset instead of a liability. I [fol. 252] think it is the duty of the Municipality to strive to get such a thing.

Commissioner Flad:

Q. It has been suggested to elevate the tracks with suitable structures, that it would be very much cheaper. Could you, as an architect, think of some manner in which that could be done?

A. Best one was in Berlin, elevating the tracks on concrete and enclosing them so the trains as they passed would be practically hidden. I am still strongly of the opinion that the tracks should be depressed.

Mr. Brown:

Q. Referring to Mr. Flad's questions, you are aware of the fact that north of Delmar on the east side, the City plan purposes that

the tracks be elevated north of Delmar on earthen embankment and propose to protect this high-class residence section in here by those trees and shrubbery. If that is proper there, would it not be just as proper south of Delmar?

A. I think not. You are ignoring Union and Lindell boulevards. That is one of the keys and Delmar is the other. It is the plan of the City Plan Commission to get those railroad tracks out of view as much as we can. I take it the City Plan Commission when it gets down to details of the railroads is going to realize that it can ask for separation of grades where it is essential.

Q. From the point of view of the City Plan Commission, it is just as essential to have all the railroad tracks depressed?

A. No; I would not say that. That is not the way the City Plan Commission works; it takes items up in detail, often not adhering to a strict policy because of conditions that exist. To illustrate: Take the case of our street widening. We would perhaps prefer to widen [fol. 253] a street right straight through uniformly, but we find because of property conditions it is oftentimes necessary to change that line and swing it out here and there; regardless of its general policy, we might adhere to the width of the street but not to the alignment when we get to studying the transportation in detail. In other words, the Commission find themselves confronted with conditions opposite to their theories.

Q. Going back again to the question of railroad tracks generally in the City, from the standpoint that all railroads should be out of view, that would be true of all railroad tracks on the ground regardless of whether it was in connection with the matter of grade crossing?

A. To a certain extent. The City Plan Commission is working solely for the best interests of St. Louis in its entirety. I think it would like to get all those tracks out of sight. I don't say it will do that because, as I say, conditions might arise.

Q. This may be one of the conditions?

A. It may be, but I cannot see it. I give the City my services without any pecuniary reward.

Mr. BARTHOLOMEW, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

I am engineer of the City Plan Commission. I have been in this work about ten or twelve years now.

Q. Where did you qualify?

A. Rutgers' College.

Since I left college, with the exception of two years, was engaged in consulting work and in city planning work. I am now consulted on special plans for other cities. I have acted as consultant [fol. 254] ant for Pittsburgh, Detroit, Washington, D. C., Omaha, and for a number of smaller cities.

I am still being constantly consulted by planning commissions in

other large cities. I have gone into the grade separation of grade crossings here and have made a study of present plans of the City for separation of grade crossings of the Wabash, from esthetic as well as practical standpoint.

Q. Give the Commission your judgment whether the depression of the tracks is the proper method of separation of this grade?

A. The question resolves itself in my mind as to the character of the district, the conditions that exist. The railroad is not an essential to this particular district. The City Plan Commission has prepared and the City of St. Louis has adopted what is known as the Zoning Ordinance, which divides the city into residential, commercial and two types of industrial districts.

This particular railroad, the Wabash, passes almost exclusively through residential territory, excepting only that portion north of Delmar. The character of this district is residential, of as good a type as there is in the City. The railroad having no particular relation to that district, should be subordinated, so far as view goes. This is one of the heaviest automobile traffic centers in the City. There are probably few streets down town that carry more traffic. On special occasions there is a vast amount of pedestrian traffic; it is in relation to the vehicular traffic the depression is by far the most desirable form for handling railroads, because elevations would act as obstructions, prove dangerous for intersections such as Union [fol. 255] and Lindell and Delmar. They would obstruct the views of approaching traffic to the intersections at different streets and might tend to increase the danger at these points rather than to eliminate it. I have seen these plans.

If the tracks were depressed according to that general plan, the railroad tracks and right of way would be practically hidden from the view of Lindell between Union and Kingshighway and it would be much more beautiful than it is now.

Q. It would be subject to treatment by landscape gardeners?

A. Much more satisfactory. The approaches and viaducts and bridges that are to be swung over these tracks could be made artistic. There have been no detail plans drawn that I have seen.

Q. It would not be unsightly, aside from also being less dangerous?

A. No; these bridges would be seen to no such a degree as they would if the tracks were elevated. By elevation of the streets over the railroad tracks traffic conditions would be better.

Cross-examination by Mr. Brown:

Q. Have you considered this question solely from the standpoint of the "City Beautiful"?

A. I am an engineer. All my studies have to do primarily with the question of traffic and of the question of City growth, determination of residential districts and industrial districts and the effect of invasions and their relations to the districts. I said in so far as the relation of the railroad to the district is concerned, there was no use of the railroad south of Delmar. I did not say it should be removed.

From the standpoint of the City planning, the district would be

much better off if there would be no railroad there at all. I never [fol. 256] have seen the detailed cost for elevation. I don't recall the total costs now; but my remembrance of the figures at the time I examined the plan is that there was very little difference between the elevation and depression.

Q. You say you have never seen the estimates on elevation?

A. I don't recall whether I saw that at the time or not.

Q. Did you consider that fact as to whether there was a difference in the cost?

A. Yes; to this extent: There are no physical, serious physical reasons that would materially make a difference between depression and elevation. I should say if elevation were attempted (which I hope never will be), but if attempted in a manner in keeping with this district, it would be very expensive.

Q. Do you regard the overhead structure of the Wabash in Forest Park as being unsightly, presenting an eye sore?

A. As compared with other structures of the Wabash, it is infinitely better. There is no difficulty in making such structures ornamental, but there is something to be considered other than the structure, and that is the appearance of the railroad. The park would be much better off if the embankment were not there. The present embankment is very nearly as satisfactory as embankments can be made.

Q. Isn't it as satisfactory as a ditch could be made with an embankment on each side of it?

A. An elevation or embankment immediately catches the eye from almost any standpoint; a depression is something one sees only when one stands on the brink of the depression.

[fol. 257] Q. You overlook the fact that the City proposes on each side of this brink to throw up an embankment?

A. The topography of the park makes it necessary. The height of that embankment varies at different points. At no point does it reach as much as the present Wabash embankment. It varies so much, I would not venture an idea. The purpose of the park, as I understand parks, is they are places of unobstructed views in so far as it is possible to make them; an embankment, particularly one from a railroad elevation, would be a decided evil. It would not necessarily require the cutting down of the hills of the park. The beauty of the park lies in its undulations. If the obstructions are the result of study and design, they lend themselves to landscaping in the park. That would not be true of an embankment through the park. It would not be equally as true of an embankment as it would of an excavation.

Q. You think it is more simple to landscape an excavation than an embankment?

A. It is.

Mr. Daues:

Q. I will hand you Ordinance No. 30199 of the City of St. Louis and ask you what that is?

A. This is known as the Zoning Ordinance, dividing the City into three classes of districts. The law is in effect.

Q. Particularly how does it affect the property adjacent to the Wabash crossing at Delmar and Union?

A. South of Delmar the railroad passes through nothing but residential property to Kingshighway; all high-class residential property.

Mr. Brown:

Q. North of Delmar and between Hamilton and the Wabash [fol. 258] tracks, how is that property?

A. First class, residential for a distance of three blocks, and from that point on Hodiament is commercial. The property on either side of the railroad is industrial. The Delmar front is commercial, then from the alley north of Delmar to Cates, two and one-half blocks are first-class residence district. Same as south of Delmar. North of that point Hodiament front is industrial fronting on railroad; the extreme north point is Cates. It runs clear to the western industrial section on Natural Bridge. Clemens avenue is in that first-class district.

Q. West Cabanne?

A. That is more than two and one-half blocks. The frontage on Hodiament has been made commercial. Practically a lot depth on Hodiament is commercial. Same as on Delmar. East of that is first-class residential property. From that point north some districts are second and some are first class. That does not continue to City Limits; it is interrupted by industrial property on either side of the Terminal Belt Line. To the north it continues to the City Limits with that exception. If you follow the City Line around until you get to Broadway in the extreme north end, there it is industrial and along the river.

Q. All that district along the Wabash north of Delmar will be confronted with an elevated structure?

A. Yes; for two and one-half blocks. The railroad veers there and that is industrial property on either side. The map at page 6 (Exhibit 86) shows that.

Zoning Ordinance No. 30199 of the City is offered as Exhibit 86.

Next offer in evidence is certified copy of agreement between the [fol. 259] Boards of Commissioners of Forest Park, the St. Louis County Railroad Company, and the St. Louis, Kansas City and Northern Railway Company, together with map as recorded in Deed Book 620, page 8, filed for record September 5, 1879, with plat attached. And as I am doing that will you be good enough, Mr. Burns, to tell me which of these roads you are the successor of?

Mr. Burns: We hold through the St. Louis & Colorado Railroad.

Mr. Brown: The Wabash is successor to both those roads.

Mr. Daues: I offer this as Exhibit No. 87.

NELSON CUNLIFF, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

My name is Nelson Cunliff. I reside at 5719 Cates. I was at one time Park Commissioner of the City of St. Louis. I am now secretary and manager of the Housing Association; that is not connected with the City government. I was Park Commissioner from January, 1915, to January 1, 1929. Prior to that I was associated with Park Commissioner Dwight Davis as engineer, eight years. I am entirely familiar with Forest Park and with the flood of August, 1915. I have examined the proposed plan of the City Government for the separation of grade of the Wabash tracks with the intersection of De Balivere and Union. So far as regards the features of the park are concerned the plan for depression is infinitely better than elevation of the railroad. From an aesthetic view the depression would be much [fol. 260] more desirable. The Park Department keeps up the sodding, etc., of the Wabash embankment in Forest Park. It has been the endeavor of the Park Department to keep it as sightly as possible. Forest Park boulevard stops at Kingshighway going west because it could not make an approach into the park, because it couldn't get either over or under the tracks of the Wabash.

Q. What do you say with reference to the idea of the City of moving Grand Drive when the depression of the tracks takes place. Would that add to the beauty of the park, in your judgment?

A. It would help a great deal. It would undoubtedly beautify and make more useful Forest Park. It is possible from the standpoint of park engineering to make a depression for railroad tracks sightly by sodding them and planting shrubbery and matters of that kind along the slopes. The plans call for a depression of twenty-two feet at Union avenue, and for an embankment on either side of the line of tracks, which embankment would be about twelve feet high; as I recall the tracks at Grand Drive are about twenty-two feet. The plan, as called for by the City, would lower the embankment where it crosses Grand Drive at present at least five feet, which would open up that space there and allow for the larger portion of the park to be viewed from the principal or main entrance to the park. This scheme would be carried out with embankment on either side with slopes more gentle than the present, and instead of making them with cinders, good soil would be used for that embankment, which would allow for proper planting. If the [fol. 261] Wabash has any rights in Forest Park, those rights grew out of this tripartite agreement which was just introduced as Exhibit 87. I am familiar with that agreement and that they were to keep the embankment sodded and kept up properly. They have not complied with that. They send us a letter every year after the trees come out, asking permission to chop down trees or limbs that get in their way.

Cross-examination by Mr. Brown:

Q. If the question of grade separation at Lindell was put to one side, and it was merely a question of locating the railroad in the park, I understand that you would prefer to locate it in the excavation rather than on an embankment?

A. Yes, sir. I don't know what the view of the Park Commissioners were at the time the road was located.

Q. You are familiar as part of the park laws, that the Park Commissioners had to approve of the 70-foot right of way that was granted?

A. Yes; that was fifty years ago. I assume the Park Commissioners did approve the construction of the railroad on present embankment as shown by plan attached to contract. In that respect my views differ from those of the Park Commissioners at that time. I entertain that view independently of any question of grade separation for this reason, conditions of park work have changed materially during the past forty years, and our parks have become recreation grounds and they are now intensely used. If I were Park Commissioner I would not approve putting it in the park at all. Assuming that it had to go in the park I would not approve this location on an embankment.

[fol. 262] HENRY WRIGHT, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

I am chairman of the Public Service Committee of the St. Louis Chapter of the American Institute of Architects. The architects, in their society, have taken up this question as to the propriety of separation of grades at Delmar and Wabash tracks. The matter was presented to them some two or three years ago, and at that time they went quite carefully into the plans from the point of view of the resultant appearance. Then, in this later date, plans having been revised to some extent, the committee, of which I am chairman, and also a number of other architects, went over them and had them explained to us. It was the unanimous opinion of all those present that the grades be separated in the manner recommended by the City.

Cross-examination by Mr. Brown:

Q. Have you ever considered the possibility of separating grade crossings by proposing compromise of grade of the tracks and grade of the streets?

A. We have not gone into the engineering feature of the plans. We considered from the appearance, their effect on the street, on the district and its surroundings and the presence of the railroad in the park.

Q. Your conclusions are based on those elements alone?

A. I would say they predominated. We were interested in the question of cost to the extent that the plan would not be prohibitive.

[fol. 263] We would not care to consider something from our standpoint that was felt to be impracticable.

Q. Having once reached the opinion that the depression plan was possible from an engineering standpoint, would the fact that it might cost a great deal more than the elevation plan have any effect on influencing your conclusion?

A. I don't know that that point was so presented to us, as I recall it. From an engineering standpoint I would consider the question of cost would be one of the elements that should have consideration.

Q. You would not say, then, that the question of appearance should be the sole governing feature determining whether the grade should be separated by the so-called depression plan, or the so-called elevation plan?

A. No, sir. This plan was taken up from time to time and the last time the committee of four and five or six other responsible architects were present, members of the executive committee. There are 65 members of our society. I think you should consider that these men come from all over the City, representing all parts of the City in their profession.

Q. You say there were four or five members present when this was approved?

A. No; there were ten at that time, including the chairman. I have given this matter my personal attention to the extent of having examined the plans both times they were presented and to the extent as a man interested in the growth of St. Louis; the idea of its very important effect on the property values in St. Louis and its effect in Forest Park.

I am not particularly conversant with the handling of railroad tracks generally. My interest is in this particular location, and [fol. 264] while I might have my personal opinion, it would have no particular value from the standpoint of experience.

Assuming that the separation of grade crossing was not involved, taking this road through this particular district, I don't know that the City would be warranted in asking that the Rock Island and Wabash should go ahead and make this expenditure and depress their tracks at an early time if there were no grade separations necessary; but it would not change my view as to how it should be done. During the times I spoke of our committee considering this plan of grade separation, I doubt whether we had any detail track elevation information. I don't remember any.

Q. The only real plan then that was considered was the plan for depression of the tracks?

A. The one that we considered. I should prefer to have another member of my committee speak as to whether it is possible to elevate tracks that would be agreeable to the view by graceful structures. My position is that there is only one plan, that of depression. I have given no consideration to any other plan.

Q. Don't you think, as an architect, that it is possible to formulate a plan of elevating the tracks that would be pleasing to the view?

A. Absolutely none.

Q. Do you think that the City is perpetrating a crime on its

citizens and residents out there in the district north of Delmar where the City's plan calls for an elevation of the tracks?

A. Mr. Russell explained that. Mr. Bartholomew testified that the elevation of the tracks to the north of Delmar would effect only [fol. 265] a very small area; it is infinitesimal and runs through an industrial district.

LOUIS LA BEAUME, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

I am an architect connected with La Beaume and Klein, Chemical Building. I live in the City of St. Louis, and have been an architect for a great many years. I have examined the plans proposed by the City of St. Louis as a method of separation of grade crossing at Delmar and the Wabash tracks. Viewing it as an architect, I think that is the proper method, as contra-distinguished from the other method of elevation. I favor the plan as prepared by the City. Seems to me the only way it ought to be done. At one time I aided the City in preparing this plan and gave it considerable thought.

Q. Is it possible to make a railroad embankment or trestle erected along that route or territory under consideration agreeable or sightly?

A. I think not. I have heard of the plan of the railroad to elevate the tracks. I am in favor of your plan as against that of the railroad. I think it is very obvious to anyone that considers the proposition that the depression of a long line of railroad trackage is better than elevation. We have all seen elevations that have not been made beautiful; I think the depression of the tracks here would tend to enhance the value of the property rather than depreciate it. I think this ought not to be considered from the first cost of one [fol. 266] or the other schemes, but should be considered from the standpoint of ultimate benefit to the City. I understand there is very little difference between the cost of elevation and depression. The damage to the City by elevation of tracks far outweighs the difference in cost that depression might involve.

Commissioner Flad:

Q. Your opinion favoring the depression of the tracks is based on the assumption that the cost would not be very much greater?

A. I am told that it would not be very great.

Questions by Mr. Flad:

Q. The element of cost should enter into the question?

A. Yes, sir; that enters into every character of construction work. The first point I made was that I didn't think a scheme of elevation of the railroad tracks could be made tolerable in that part of the City; and the next that the difference in cost of the two plans should not

be taken into consideration, that the determining factor should be that of benefit to the City. The elevated plan should not be tolerated at any time.

Q. Something has been said about present conditions, that the Wabash tracks are now on an embankment in Forest Park and that the embankment is not sightly, notwithstanding the Park Department has done its best to make it sightly?

A. Yes, sir; whatever artists might do, it would still be objectionable to have it on an elevation. I am familiar with other embankments of the Wabash, the one at Vandeventer, too. My opinion is that we should not consider the elevation plan at all.

[fol. 267] Cross-examination by Mr. Brown:

Q. You have approached this subject from the standpoint primarily that it is to the best interests of the City to have the tracks depressed?

A. That is my natural conclusion. I have been asked to give my technical opinion on this question, as to which of the two plans ought to be adopted. I was not asked to consider what hardship would be worked one way or the other. I was told that the cost of depression would not be materially different from the cost of elevation. But if it were materially different, I think the plan should be considered solely from the standpoint of benefit to the City.

WILLIAM A. FOLEY, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

I am civil engineer for the water department. I have made an estimate of the total cost of adjusting the water mains to meet this entire plan. My estimate of the total cost is \$43,192.63. I have made a detailed report of that and that report is here.

Said report is marked Exhibit No. 88.

Mr. Brown: No questions at this time.

GEORGE H. PACKWOOD, JR., being duly sworn, testified as follows.

Direct examination by Mr. Daues:

I am an electrical engineer connected with the firm of C. E. Smith & Company, Consulting Engineers. I live at Taylor and [fol. 268] Westminster. I have had scholastic training in engineering. I have made an estimate of the cost of changing signal lines as a result of the City's plan to separate grade crossing at Delmar and Wabash tracks and south to Union boulevard. If you wish to install new ones the cost would run between \$9,000 and \$10,000.

To relocate the signals would cost between \$3,000 and \$4,000, depending on the amount of material they would require; it would be under \$5,000. Assuming that I didn't buy anything in making the adjustment to new grade, it would cost just a little less, around \$2,000. To securely protect the single track that is proposed to be used during the construction period will cost around \$4,000.

Cross-examination by Mr. Brown:

Q. What signals do you refer to?

A. The automatic signals. I am not talking about the interlocking plant. I mean temporary signals that will protect the track, with red and green lights. The semaphore posts.

Commissioner Bean:

Q. There won't be any interlocking?

A. No, sir; there will be only two main line branches. I understand that the Rock Island connection with the Wabash is interlocked at present.

Mr. Burns:

Q. You propose to put the Rock Island out of business there? Don't you understand that the Rock Island uses the Wabash tracks into Union Station at present?

A. Yes, sir; I understand the Rock Island and the Wabash will use the tracks through the park according to the City's plan if they do not branch off at Union.

Q. Assuming it was necessary to continue the present interlocking plant, what would be your figure?

A. I should estimate around \$25,000.

Mr. Daues:

Q. Assuming that the Rock Island resists and does not feel and does not aid as we thought it would and we are compelled to fight them with the rest of the Wabash, and if we are compelled to limit the Rock Island on present right of way to the new grade, give us roughly what that would amount to?

A. I should imagine somewhere in the neighborhood of \$5,000. My figures do not take into account change in ordinary block signals from their connection with the Wabash near Union west to the City Limits on the Rock Island. The Rock Island has up-to-date signals there now, but I don't know just how far they go out.

Adjournment to 10 a. m., March 25.

Friday, March 25 10 a. m., 1921.

E. R. POLLOCK, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

My name is E. R. Pollock; I am a civil engineer connected with a construction company as engineer. My company is List & Gifford Construction Company. I have been six months with this company. I have done this character of work twenty-five years.

I have been employed as construction engineer on a great many different railroads throughout the country, more particularly in the Far West with the Denver & Rio Grande and the Colorado & Midland and in the east with the Missouri Pacific, with the Louisiana & [fol. 270] Arkansas and a number of smaller companies.

I have been furnished with a set of plans of the proposed work of the separation of grade at Delmar and Wabash tracks and also the other streets south of Delmar. I have made a careful estimate of the costs of grading and track work that would be involved in such a plan.

I have prepared a report of the approximate cost of change of grade and alignment of the Wabash Railroad from Kingshighway to Etzel avenue, excavation and embankment, together with necessary track changes, disposition of material, character of soil and quantities; this is all set forth in this report in detail.

Said report offered as Exhibit No. 90.

Q. What is your conclusion as to what the total cost will be?

A. Amount to approximately \$423,380.

Beginning at Kingshighway and extending west to a point near Union and Lindell, the work could be handled with team work or small shovel, the material so excavated between those two points would be used for making necessary embankments for roadbed, necessary embankment on the south side of the proposed roadbed, as suggested by City plan, and approaches to new Grand Drive and new Union avenue, overhead construction.

From Union and Lindell to Delmar boulevard the bulk of the material is to be excavated and this material can be transported west into the embankment extending from Delmar west to City Limits, and from City Limits to Etzel avenue, to be deposited in an embankment [fol. 271] on that parcel of land lying north and west of present Delmar station; bringing this tract of land to an elevation of eighty-four feet, which would accommodate the majority of the excess excavated material. This is a general outline of the construction plan.

Q. What would be your plan as to handling railroad traffic?

A. It will be necessary to operate a single track line from Kingshighway; I would use present westbound track of the Wabash from Kingshighway to a point near Union; from Union I would construct a single-track railroad occupying the alley between Pershing and the present Wabash tracks, then through the alley between De

Giverville and present Wabash tracks to a connection with present westbound track at Delmar. It certainly would be practicable.

Q. This problem out here presents nothing unusual in the way of engineering feature?

A. I see nothing outside of the drainage of the cut, which will have to be handled very carefully as the construction proceeds. But from the operating end of it there is nothing more difficult about this than elsewhere?

A. No, sir. This drainage I speak of, I think it is possible to take care of all the natural drainage which will follow in ordinary rainfalls through this excavation and the problem must be scientifically handled.

Questions by Mr. Burns, of the Rock Island:

Q. What provision have you made for handling the Rock Island?

A. I have not made any; I was advised that the Rock Island was a separate feature.

Q. Assuming that that is the only entry that the Rock Island has, wouldn't you have to make some provision for that?

A. Yes, sir. That would add to the cost about between 60,000 [fol. 272] and 100,000 yards of extra excavated material from point near De Baliviere west to a connection with the present Rock Island. I have not given this serious thought and am not prepared to give any definite idea. I have no idea how much it would cost in addition to the \$423,000 I spoke of without giving it some study. It would undoubtedly make a substantial increase. My estimates were based on present costs of material and labor.

Mr. Brown:

Q. Does this report you have filed show the unit cost?

A. Yes; particularly in reference to the grading and in a majority of instances. That does not include cost of bridge work, only embraces cost of excavation, taking up and relaying tracks. Grading and track work, together with the ballast. Does not include any amount extra for cost of operations during construction period. The present embankment occupied by the two main lines of the Wabash would act as an embankment on the north side. It is my understanding the City proposes leaving a portion of present embankment where it is. The portion not to be left is to be excavated. This is shown in the report. Making the approaches to Grand Drive have been taken into consideration in this report. Grand Drive will require to be relocated. I have not taken into account the cost of that. I have taken into account only the drainage that would affect the construction work as it progresses, the drainage that will have to be taken care of behind the steam shovel during the construction. I have not taken into account any of the permanent drainage work called for by the City's plan. I have not taken into [fol. 273] account any portion of the cost of the proposed viaduct over Delmar, or any part of the straightening or improving of River des Peres around Delmar. The report shows how I propose to take

care of this drainage I have taken into account. I have, in a general way, made an examination of the character of the soil through which this excavation is to be made. Have spent considerable time walking over and observing from my point of view the character of the excavated soil there.

Q. You have made up your mind just from the view of the surface of the ground?

A. Yes, sir; and certain cuts developed the character of the soil. I am familiar in a general way with the channel of the River des Peres. This report shows unit cost per cubic yard for excavating and moving dirt in the manner we provided. I have figured on a dry excavation. These things are being considered in my report. If my company were bidding on contract for work of that sort, I would figure on dry excavation on that. I would make no allowance for wet excavation unless specifications called for a wet excavation problem.

Q. Take the case where specifications call for dry excavation you take a chance on what you run into?

A. Yes, sir. I would make my figure on dry excavation. I would be willing to submit bid on that basis. I got my unit prices from general prices throughout the country at this particular time, taking into consideration labor and other problems incident to every construction work of this kind and character. Unit prices are divided into three or four sections with different unit prices on different sections, but it will approximately amount to 97 cents per [fol. 274] cubic yard for excavating material.

Q. That includes hauling in order to waste the material?

A. Yes; you will understand that in matters of that kind the matter of hauling would enter largely into bids submitted for the work. I stated we utilized wastage from excavation through the park, that we would dump that on the portion of the line north of Delmar that is to be elevated. There will be a surplus of that material, in the neighborhood of 125,000 yards. That will be placed in an embankment opposite the present main lines of the Wabash at a point about 300 feet east of Delmar, where the City proposes to change the channel of the River des Peres, that would take care of in the neighborhood of 30,000 to 50,000 yards.

Q. You understand the proposal of the City is to construct at this time only that portion of the complete plan that relates to the viaduct over Delmar?

A. No; I am not familiar with the plan of the City in that respect. I have been looking at this as a construction problem.

Q. If it is true that the City proposes at this time only to construct the viaduct over Delmar, none of the material for the embankments of the viaduct or for the River des Peres could be taken from the right of way south?

A. I want to point out the ridiculousness of that question. If we are only going to construct the viaduct over Delmar, how is he going to have a foot of ground?

There won't be any if you are only going to do Delmar.

Q. Assuming the viaduct of Delmar is constructed, then what

would you do with the surplus wastage? The suggestion from the City is to do nothing at this time except to construct the viaduct on [fol. 275] Delmar?

A. The viaduct is part of this whole plan, but I have not taken the viaduct into consideration.

Q. You took it into consideration to the extent that you took care of the surplus of this wastage in the River des Peres?

A. Not in the river, in the change of the channel. Under the plan presented by the City, it is their intention to change present channel of the River des Peres at a point in Delmar.

Q. There is City's Exhibit 77 (small model); will you point out in there to the Commission where that wastage would be dumped?

A. There is ample dumping ground for all surplus wastage north and south of Delmar, west of the Wabash in the old channel of the River des Peres when the channel has been moved to the east. Plat contemplates at present that the present channel of the River des Peres shall be moved to the east, a distance between center line and the new channel of approximately 100 feet, that would leave a strip of land 100 feet in width and extending about 1,000 feet parallel to Wabash tracks, and would accommodate about 30,000 yards of material. This plan shows proposed channel east of present channel. At the point I refer to, the east bank of River des Peres is almost parallel and adjacent to west line of the Wabash at present.

Q. The City merely proposes to enclose that, as I understand the exhibit, enclosure to be made in present channel of River des Peres at that point south of Delmar; if that is so, is there any opportunity for wasting any of the material at that point?

A. I think there is. I am informed the City owns that land.

Commissioner Flad:

Q. I notice the blue print is not quite accurate with the model; isn't that correct?

[fol. 276] A. No; this blue print only shows the deepest point of the River des Peres.

Q. While you are there, Mr. Bowen, can you tell us what land would be available?

Mr. Bowen: The City owns the strip along the west side of the Wabash right of way, sixty-foot frontage south side of Delmar, and extends southwardly along the east line of the River des Peres to the alley between Westminster Place and Washington and the width of this land decreases to a strip twenty-two feet wide and continues on to the south parallel to the Wabash tracks to Kingsbury boulevard, and beyond. Immediately west of this tract the City owns is a sixty-foot public street, in the center of which it is proposed to place a culvert which will extend from Delmar to Kingsbury.

Q. Now, Mr. Pollock, on how much surplus material had you

figured on that part of the City's land that has been described by Mr. Bowen?

A. Approximately 30,000 yards. The balance of wastage to be deposited in the piece of vacant property north and west of the present intersection of Wabash tracks and Delmar. I don't know who owns that property.

(Permit from Sarah Investment Company, owners of property, filed and marked "City's Exhibit 91.")

Q. How do you intend to dump that material?

A. By a system of tracks adjacent to the property, which is adjacent to the Wabash right of way; it could be reached from the excavation. The tracks could be laid on the surface.

Q. Tell us just what provision you have made for drainage during period of construction?

A. By operating steam shovels on an ascending grade, keeping [fol. 277] the water behind the shovels at all times; by construction of temporary ditches and sewers connecting with any existing sewers that may be now located, especially to present sewer at Union and Lindell. I have made no provision for taking care of subsurface waters. I will furnish you with copy of my report. I am located in the City where I can be recalled for further examination.

Mr. Daues:

Q. You included in your costs everything except the bridge on Delmar?

A. Yes, sir.

C. W. MARTIN, recalled.

Mr. Daues:

Q. You have figured on the entire plan such portion as Mr. Pollock testified to?

A. Yes, sir.

Our estimate embraces all work except a list which follows. Estimate covers work on Wabash grade crossing elimination between Kingshighway and City Limits, a supplementary estimate of the costs from the City Limits to Etzel avenue, as per plans by the division of bridges and buildings of the City of St. Louis contained in drawings numbered 1 to 32, inclusive.

Following was not included: Excavation and embankment for tracks; ballast and track work; telephone and signal line reconstruction; brick sewer through Forest Park; changes in City water mains and embankment for bridges, except Delmar, which is included; to which we might add property damages.

Second sheet of this estimate (Exhibit 92) sets forth the cost of [fol. 278] the work from Kingshighway to City Limits, including seven bridges over the tracks; one railway bridge, trestles for in-

dustrial spurs, retaining walls along tracks, track and railway cut drainage, River des Peres culvert and channel, Blackstone sewer construction, sewer work and street drainage, plant and equipment, general expense and contingencies, will be \$1,207,929.31.

Cost from City Limits to Etzel, including railway bridge at Maple avenue, culvert at Bartmer, street crossing at Bartmer, trestles for industrial spurs, plant and equipment, general expense and contingencies, will be \$144,272.54, making total cost of \$1,352,201.85.

On third sheet of this estimate shows subdivision of estimate into work chargeable to grade crossing elimination, and to industrial spur adjustments, into what we call general work and reconstruction of industrial spurs, and is again divided between Kingshighway and City Limits, and City Limits to Etzel avenue.

The cost from Kingshighway to City Limits is \$1,113,348.01, of which amount \$91,581.30 is for reconstruction of industrial spurs.

Cost from City Limits to Etzel for general work, bridges, culverts, retaining walls, etc., \$53,893.51; for reconstruction of industrial spurs, \$90,379.00, making the total \$1,352,201.85.

Following, there is a division of the estimate for Kingshighway to City Limits, on page five of the estimate for seven bridges over the tracks.

Page 6, one two-track railway bridge over the Olive Street Road, and also trestles for industrial spurs between Delmar and the City Limits.

[fol. 279] Page 7 of the estimate is schedule of the cost of retaining walls along tracks and track and railway cut drainage between Kingshighway and City Limits.

Page 8 is schedule of cost of River des Peres culvert and channel and reconstruction of the Blackstone sewer at Union and Lindell avenues.

Page 9 of the estimate is schedule of cost of miscellaneous sewer work and street drainage; and all of this being between Kingshighway and City Limits.

Page 10, plant and equipment charges, also general expense.

Following that I have City Limits to Etzel, on page 12, schedule of costs of railway bridge at Maple avenue, \$53,106.65.

Page 13, cost of culvert at Bartmer avenue, and trestles for industrial spurs between City Limits and Etzel.

Following that I have a heading calling for schedule of unit prices, and in this, for doing of this work, including miscellaneous items, liability insurance, etc.

Page 15, we have concrete materials, carload lots, cement, sand, binder gravel and concrete gravel, opposite which is the schedule price per unit in barrels and tons, next column is the cost of handling, next column insurance, waste and the total cost per unit for barrel of sand, or ton of gravel.

Following that, same page, concreting cost at which these materials are entered at prices given in the material cost schedule, to which is added oil, gas, coal, water, liability insurance giving cost per

cubic foot of 37½ cents, which costs do not include cost of form work.

Preparing forms, cost per square foot, lumber, wire, nails and la- [fol. 280] bor for building, wrecking and insurance, a cost of 22½ cents is arrived at. Forms for bridge decks add 50% on material and 25% to the labor, making a total of 27½ cents per square foot.

Page 16 of this schedule there is listed steel reinforcement per ton base price f. o. b. cars, extras for size, bonding charges, unloading, hauling and racking, placing and wiring, insurance on labor, tie wire spacers, total cost per ton \$78.00, and the cost per pound, \$.039. Concrete walks per square foot, \$.238. Brick pavement, 50 cents per square foot, and wood block pavement is 68.8 cents per square foot.

Page 17, all items included. Concrete pavements 26 cents per square foot for material.

Granite curbing, \$2.32 per lineal foot.

Concrete curb and gutter per lineal foot, \$1.12.

Concrete railings, walls north of Delmar, material, labor and insurance, \$3.95.

Brick railing on bridges, per lineal foot, material, labor and insurance, \$.508.

Page 18, manholes and inlets. We have here three classes of manholes, A, B and C; and two classes of inlets, A and B. Class A manholes is scheduled under cost unit \$53.60. Class B is \$42.80. Class C is \$89.45; and the inlets \$20.60.

Concrete gutters A and B, per lineal foot, this is scaled on the plans, material, labor and insurance is 89 cents for Class A and \$1.34 for Class B.

Concrete piling, for labor, material and insurance is \$1.95 per lineal foot.

Macadam roads, for material, labor and insurance is 15½ cents per square foot.

Oil macadam, to which is added the cost of oiling, is 21 cents per square foot.

Asphalt pavement is 50½ cents per square foot.

[fol. 281] On page 19, framed trestle, worked out for 14-foot bent, material, labor and insurance, cost per lineal foot, \$16.67. This also includes cost of replacing track.

Vitrified pipe sewers is the next heading on this same page, for which respective prices for material, labor, insurance and miscellaneous is \$1.24 for the 12-inch; \$1.84 for the 15-inch; \$2.29 for the 18-inch; \$2.84 for the 21-inch; \$3.62 for the 24-inch; \$5.14 for the 30-inch; \$6.59 for the 33-inch, and \$7.60 for the 36-inch.

Eight-inch cast-iron pipe sewers, per lineal foot, material, labor and insurance, \$1.91.

Eight-inch drain tile, material, labor and insurance, 59 cents per lineal foot.

The quantities, we have Mr. Bowen's estimate.

Q. No suggestion has been made to you of what the cost would be. It is a question of your independent investigation?

A. Yes, sir.

Mr. Burns:

Q. Have you made any provision for the Rock Island?

A. No; only took what was shown on the plan, same as I would figure any other job. I don't know whether that would greatly add to the expense if some provision had to be made for the Rock Island.

Q. Do you know anything about the situation of the Rock Island at that point?

A. I didn't make any estimate of that. Assuming the Rock Island would use this same entrance into the City, that would have to be considered and it would add to the cost.

Mr. Brown:

Q. You have taken the quantities shown on Mr. Bowen's plans?

A. We have estimated the quantities from his plans. We made no survey; we accepted his plans.

[fol. 282] Q. Your report that you filed shows separately your estimate of the cost of the viaduct over Delmar boulevard?

A. Yes; I presented the report the other day. This estimate also includes Delmar. I have a separate estimate for Delmar, Exhibit No. 31, of cost of construction of Delmar viaduct.

Q. Does this report show the unit cost of the excavation through the park and north to Delmar?

A. No; as I said when I started out, there are six items that are not taken into consideration, and the first of these six items is excavation and embankment for tracks. The item referred to is 70 cents per cubic yard, and that was given me by the City; you furnished me that one item of cost.

R. M. BRISTOL, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

I reside in St. Louis; I am a general contractor; vice-president of the Myers Construction Company. I have been in business eight years; in the general contracting business practically all my life.

I made an estimate on sewers for the City. I have my report here. (Report marked "City's Exhibit No. 93.")

This is a summary estimate of tunnel and open cut sections of 42-inch brick sewer, running through Forest Park over to Tamm avenue and River des Peres; also estimate on proposed method of draining Wabash cut north of Kingsbury to the proposed River des Peres storm water sewer, with size 18-inch pipe; also an estimate for [fol. 283] proposed method of draining railroad cut after the River des Peres closed sewer is built, using size 36-inch pipe on Union avenue.

The cost of the 42-inch sewer is \$335,798.50.

The cost of the 18-inch pipe is \$5,762.

The cost of the 36-inch pipe is \$14,962. 925 lineal feet.

My report shows unit prices both for the tunnel and the open-cut work.

Mr. HEMMELMANN, recalled.

Mr. Daues:

Q. You have made estimates for the City, have you not?

A. Yes, sir. Estimates of damages for this entire property. The net damages is \$89,502.09; that is my best opinion of what a commission would allow under the circumstances. That includes all real estate, commencing at Lindell and Union east of Union a little ways, to Maple on the north.

Forest Park belongs to the City. I have also taken into consideration the real estate it will be necessary to purchase or condemn. My estimate is all of the damage to property by reason of the change of grade construction of the work according to plans and all of the property that should be taken by virtue of the depression.

Cross-examination by Mr. Brown:

Q. Have you taken into account the value of the Wabash right of way through the park?

A. No, sir; I have not. I have only taken into consideration the effect it would have on the abutting property.

[fol. 284] Mr. Burns:

Q. Have you made any estimate of the damage that might accrue to the Rock Island?

A. No, sir; I have not studied that situation. I don't think that situation would be nearly as serious as the Wabash because the backs of the houses are to Rock Island tracks.

Q. But it would necessarily make another difference, and a more expensive proposition, to take that into consideration?

A. I could not say. I don't think it would amount to very much, offhand. It might make some slight difference.

H. W. HAYES recalled.

Mr. Daues:

Q. What effect has track elevation had in Boston as reflected in property damages?

A. Speaking generally, there have been instances where tracks have been elevated in residence districts where the property has depreciated in value, and where it seems to have been occasioned by

track elevation. A particular instance was on the Boston-Providence road by track elevation. One section, which was residential property, separated from the railroad by a highway street, the assessed value of the land at time of elevation was about 40 cents to 50 cents per square foot; immediately after the elevation, the assessed value was about the same, but in 1918 the assessed valuation had been reduced about 10 per cent. This seemed clearly to be due to damage caused by track elevation. It was residential property and no change to industrial concerns had taken place.

[fol. 285] Q. What seems to be the general opinion of engineers, if you know, for public service commissions, who are studying the question of grade separation as to how it should be done, where a railroad crosses a public highway in the City?

A. As far as my opinion goes, the depression of the railroad is the proper method of separation.

Q. How do you divide the cost in Massachusetts?

A. Under the general grade crossing elimination law, the railroad company pays 65 per cent of the total cost. The municipality pays not more than 10 per cent of the total cost. The street railway, if there is one in the crossing, pays not more than 15 per cent. If there is no street railway, the commonwealth pays 25 per cent. Other public utilities are taken care of by the owners.

Q. How about the side tracks for industrials?

A. Always paid for by the industrials themselves, or by some arrangement between the industrials and the railroad. They are not paid by the city.

Mr. BOWEN recalled.

Mr. Daues:

Q. You are recalled for the purpose of introducing certain computations made.

A. I wish to introduce first a plan and profile of the Wabash tracks adjacent to the Vandeventer station of the Wabash Railway Company. Reference was made yesterday to the grades at that point; for that reason we would like to introduce this plan and profile.

(Marked "City's Exhibit No. 94.")

Also introduce report prepared by Mr. W. W. Horner, Chief Engineer of Sewers and Paving, on intense precipitation in St. Louis in relation to flood flows on the River des Peres, which is marked "City's Exhibit No. 95."

I introduce a set of blue prints of locomotives made by the American Locomotive Company, referred to in my testimony of Wednesday, but not submitted.

(This is marked "City's Exhibit No. 96.")

The City's plan of the Wabash grade elimination did not take care of the Rock Island. Our plan was based on the assumption

that the City and the Rock Island would have reached an agreement for taking up the Rock Island tracks at De Baliviere and west.

Mr. Pollock testified that the cost of doing grading and track work in connection with grade separation plan would cost a total of \$388,380 within the city limits and \$35,000 outside city limits.

Mr. Martin, of the Woermann Construction Company, testified that the general construction work would cost \$1,135,348.01 within city limits and \$53,893.54 outside. That industrial spurs within the City of St. Louis would cost \$94,581.30; the industrial spurs outside City of St. Louis would cost \$90,379, a total of \$184,960.30. With 10 per cent added for engineering and contingencies, makes the total cost of adjusting spurs, \$203,456.33.

Mr. Foley testified that changes in water mains would entail an expense of \$43,192.63.

Mr. Packwood, of Smith & Company, testified that the changing of signal lines of the Wabash Railway would cost \$3,500 for permanent work, and the construction of a temporary signal line to be used during construction period would cost \$4,000, a total of \$7,500. [fol. 287] Mr. Bristol, of the Myers Construction Company, testified that the cost of proposed 42-inch sewer through Forest Park would be \$335,798.50.

The total of all the costs along the Wabash right of way and in the park would be \$1,910,219.14. If we add 10 per cent to that for engineering and contingencies, the total will be \$2,101,241.05.

The cost of work outside City of St. Louis and on Wabash right of way and on the streets would be \$88,893.54. Adding 10 per cent for engineering and contingencies amounts to \$97,782.89.

Mr. Hemmelmann testified the cost of land and damages for entire project would be \$85,910.59 net. To this must be added cost of land owned by the City and proposed to be utilized in this project, which will cost \$25,000, bringing the total cost of project within the City of St. Louis to \$2,212,181.64. Outside the City I neglected to state Mr. Hemmelmann's estimate of damages, \$3,561.50, making a total cost of \$101,344.29. Bringing total cost of the project within and without the City to \$2,313,526.03.

Q. In the event the main River des Peres sewer should be constructed, you would deduct what?

A. Total cost just given for entire project is \$2,313,526.03. This includes the Delmar boulevard viaduct. In order to subtract from total amount the cost of viaduct, we instructed the Woermann Construction Company to figure this fill again at 70 cents a yard, if whole project were going ahead.

Q. My question was as to the River des Peres sewer through Forest Park to Tamm avenue.

A. The sewer through Forest Park was estimated at \$335,798.50. [fol. 288] That sewer is not a necessary part of Delmar grade separation.

With 10 per cent added for engineering and contingencies would make the total of \$269,378.25. If this project did not proceed until after the River des Peres sewer were built, and present high price of work remained the same, there should be deducted cost of this

sewer, leaving the cost at \$1,941,147.68. But then to that should be added the cost of constructing the sewer from Lindell and Union to the new proposed River des Peres sewer; and another sewer from Wabash tracks on Hamilton to River des Peres sewer.

These two items were testified to by representative of Myers Construction Company. The estimate on the Kingsbury connection is \$5,762. The Union avenue connection is estimated at \$14,962, a total of \$20,724. To which should be added 10 per cent for engineering and contingencies, making a total of \$22,796.40.

There would be a reduction in total cost due to the fact that we would not have such a large sewer system in the Wabash tracks between Delmar and De Baliviere as at present, because the water would not have to be carried so far.

Total cost of entire project, based on present prices, assuming the River des Peres sewer is built after the Delmar viaduct is built, would be \$1,966,944.08.

Reference has been made to plans for an elevated structure. I wish the Commission to know that the Wabash Railroad Company have not submitted to us any plans for elevating their tracks. We have on a number of occasions since this hearing was set asked Mr. [fol. 289] Cunningham, Chief Engineer of the Wabash Railway, for any plans he intended to introduce at these hearings, but no such plans have been furnished us. We furnished the Wabash with complete sets of our plans I would say about two weeks preceding the first bearing of this complaint.

Q. Have you furnished the same thing to the Rock Island?

A. No, sir. The plan providing for track elevation for Wabash was discussed with the City in 1916. I don't know whether the Wabash would like to have us consider that as their plan for this work. If they do, I am prepared to discuss it.

Reference was made yesterday by Mr. Pryor to negotiations with City officials for construction of bridge over the Wabash tracks at Delmar. The inference I gathered from his remarks was that the City acted in bad faith with the Railroad Company on that matter. I participated in a small capacity in those negotiations and prepared the ordinance referred to. I would like to present the ordinance in evidence.

Objected to for the reason that those negotiations were carried on by the receivers, and whatever was said or done at that time cannot affect the railroad company, which was at that time a different company from the present defendant.

Mr. Daves: It is offered for the purpose first to show that the plan was considered practicable; secondly, to show it has a bearing on the question of drainage; third, to show that the City has for years and years been endeavoring to do something towards eliminating this grade crossing to save life and limb and property.

[fol. 290] Mr. Brown: The present railroad company is not bound by anything that was done or said by the receivers.

(Ordinance in question is read and marked "City's Exhibit No. 98.")

Before that thirty days had elapsed, I called up Mr. Bixby and asked if he was going to accept the ordinance. He said he personally had been so busy he had forgotten the matter and that insufficient time remained for him to go before the Court and get authority to accept the ordinance.

This is an incomplete model of the portion of Forest Park through which the proposed change of grade will take place. Offer this as Exhibit No. 99 (large model.) We had hopes of having this completed before completion of this case, and we are sorry to have it in this state of incompleteness. It shows proposed embankment along the Wabash Railway Company, with the land adjacent to it. It shows the method of bringing Grand Drive over the proposed depressed tracks.

Commissioner Bean: It is crossed about how many feet from where it used to be?

A. About 400 feet of location here shown.

Commissioner Flad:

Q. How do the heights of those embankments compare with the present?

A. Twelve feet above track level and the track level is depressed beginning at Kingshighway. The present embankment over Grand Drive is about 21 feet high, at highest point the proposed embankments would be about six feet below the present level of the embankment, at that point.

Q. You say that is the highest?

A. I could not tell without referring to plans.

[fol. 291] Q. Would it be higher along Lindell Drive than it is at present?

A. Not along Lindell Drive. It would be higher at that lake than at present. The depression is thirteen feet and this embankment would be a foot below present grade at Lindell and Union and would not raise to its highest point to within six feet of its present embankment, and the present embankment is higher throughout its entire course; four or five feet higher.

FRED G. ZEIBIG, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

I live at Westmoreland Hotel. I have lived in St. Louis for many years and am familiar with the real estate business and particularly with Forest Park and its immediate vicinity. I am a member of the St. Louis Real Estate Exchange. I have been selected by the Real Estate Exchange to represent them to come before the Commission.

I want to submit a resolution that was passed by the Real Estate Exchange.

(Marked "Exhibit No. 100.")

Q. You are familiar with the City's plan to depress the Wabash tracks as contra-distinguished from the plan of elevation?

A. Yes, sir. I think it is the real plan. I am here as the representative of the Real Estate Exchange.

Cross-examination by Mr. Brown:

Q. Is it not a fact that the resolution was passed at the request of the City?

[fol. 292] A. I don't know. I am not a member of the Board. I don't know the facts except it was sent by the secretary to me with the request that I present it to this Commission and that was a month ago; at that time the hearing was deferred.

Mr. Daues:

Q. What do you say of the property around Forest Park and Union and Lindell, as being of the very best that the City of St. Louis possesses?

A. It is among the best and because of this state of uncertainty and indefiniteness a great many propositions are hanging, people are afraid to buy. If people knew positively that the tracks would be depressed, every foot of that property would sell and at better prices.

Q. If the track were elevated, what would be the effect then?

A. It would depress it worse. It would do millions of dollars worth of damage if those tracks were elevated.

Q. You are here as an expert, merely here to represent the Exchange?

A. Yes, sir.

Commissioner Flad:

Q. You think there would be several million dollars damage in favor of the depressed tracks?

A. Yes, sir.

Commissioner Flad:

Q. Suppose the City were to build it at its own expense, do you think the City would pay a million dollars more to depress the tracks?

A. Yes, sir; rather than elevate them, because the damage would far exceed that amount.

Q. And decrease the taxes?

A. Yes, sir.

Mr. Brown:

Q. Do you know Mr. Hemmelmann?

A. Yes, sir. I have not made any detailed estimate of the actual property damage that would be caused by elevation of the tracks.

[fol. 293] Q. I asked that question in order to get at what you mean when you say damage. Just what elements are you considering? Are you considering it from the point of legal damages?

A. I consider it from standpoint of relative value of the property as between the track that is depressed and when that would be elevated. I think the injury to the property by reduction of its value caused by elevated tracks would be so much greater than it would be if the tracks were depressed.

As a real estate man of long experience I am more or less familiar with the elements of what goes into legal or consequential damages. I have gone into no details, no figures at all. Just treated it as a general proposition and without regard to any question of the damages being considered as legal damages. I considered it merely from the standpoint of general depreciation that might result from what I consider an unsightly structure on the Wabash right of way.

I am familiar with the class of residences along Lindell drive from Kingshighway to Union; they are among the finest in the city. They have all been erected since the railroad was built in Forest Park. That territory in there has all been developed since the railroad was built in Forest Park.

Q. The first district north is Portland Place?

A. Westmoreland, the next is Portland. I live at the Westmoreland Hotel.

Q. That whole entire high-class residential district has developed in the presence of the railroad?

A. Yes, sir.

Q. You spoke of property not selling along Lindell drive. It is a fact that the improvement along Lindell drive has been right along [fol. 294] near the Wabash tracks. Take Mr. Woods' residence and Mr. Pryor's and those residences just east of the Wabash tracks, they are all of comparative recent construction?

A. Yes, sir.

Q. That improvement has been made in recent years, that is true?

A. Yes, sir.

Q. When you go west of Union, you get on to what used to be known as the Catlin tract, that constituted the Pike during the World's Fair?

A. Yes, sir.

Q. There was no improvement in that section until considerable time after the World's Fair?

A. There were a few six and seven-room houses built.

Q. That was all vacant for years and years after the World's Fair?

A. Yes, sir. In recent years there have been quite a number of handsome residences built west of Union on Lindell. The Walker residence, the Busch residence.

Q. Within four or five years there have been some very handsome residences built there?

A. Yes, sir.

Q. There has been quite an activity in the sale of those lots?

A. No, not activity; those lots are selling at a price at which the original holders are not getting 30 cents on the dollar. The price there is \$115 to \$130 a foot, 500 feet deep.

Q. Isn't that extreme depth the reason?

A. The person doesn't have to use it all. They are taking them gradually because of scarcity of houses, scarcity of residential property, people are forced to buy because there is so little of it. When this tract was originally subdivided, these people took it at \$150 a foot and then carried it for 10 or 15 years, and it is being sold now [fol. 295] for \$110, \$115 and \$130 a foot. The same thing applies east of Union. At Kingshighway, land is sold for \$300 a foot.

Q. Whatever improvements have been made in recent years on Lindell drive, west of Union, has been very high-class improvement?

A. Yes, sir. It is comparable to the improvements in Westmoreland or Portland place or along Lindell drive, east of Union.

Mr. Rodehaver:

Q. Are we to gather from your remarks that the railroad tracks adjacent to that district was the cause of the settlement of that district? Is that why it was settled, because the railroad was there?

A. No, sir.

Mr. Gerhart

Q. The proximity of that railroad and the fact that no effort was made to separate the grade, was that responsible for forcing development of Brentwood?

A. Because of the scarcity of good property in good neighborhoods forced people to go further out.

Mr. Brown:

Q. Take the development west of Skinker road; take south side of Parkview, restricted district; take Pershing; that property butts right up to the Rock Island?

A. Yes, sir.

Q. That property since the World's Fair has been improved and is high-class residential district?

A. Yes, sir.

Q. When you go farther west and beyond Washington University you have what is known as Maryland Terrace on the south side of the Rock Island, and that has been built up since the World's Fair?

A. Yes, sir.

Q. Then on the north immediately adjacent to the Rock Island opposite the Maryland Addition, is the Ames tract?

A. Yes, sir.

[fol. 296] Q. In very recent years that has been improved into very high-class residential district?

A. Yes, sir.

Q. And that all notwithstanding the presence of the railroad tracks?

A. Yes, sir. Because of scarcity of good property, difficulty of getting it. I am free to believe that the property would be still higher class if the Rock Island would not be there; the property would be worth more money. They are going there because they are practically forced through difficulty of locating.

Q. Would you advocate the elimination of the railroad in order that this property might be enhanced?

A. If I could force the railroad to come into the City except through that section, I would be in favor of it.

Q. And generally speaking it is this question of values and your idea of damages that influences your opinion?

A. Yes, has a great deal to do with it. Certain classes of property would be greatly benefited by the railroad, down on the levee front; but the residential section that I have specified is not benefited.

Mr. BOWEN, recalled.

Mr. Daues:

Q. If you disregard the Rock Island entirely and let them come to the ground as quickly as practicable, what, in the rough, would it cost them?

A. Without making a careful estimate, I don't think the cost of bringing the Rock Island railroad out of the proposed depression at De Baliviere to their present grade would exceed \$100,000, figured on 1 per cent grade of track.

[fol. 297] Mr. Burns:

Q. Where would you bring them out?

A. Bring them out about three thousand five hundred feet west of De Baliviere. A little east of Skinker road. The plan showed separation of grade at De Baliviere, at Skinker road and at Pennsylvania avenue, in St. Louis County. The drawing was submitted showing that satisfactory crossings could be secured by meeting with the Wabash depression at De Baliviere. This rough judgment as to what it would cost in bringing the Rock Island out of the depression is simply for bringing it back to its present grade at a point near Skinker road. This is simply an estimate and frequently these estimates double up.

E. R. KINSEY, being duly sworn, testified as follows:

Direct examination by Mr. Daues:

I am President of the Board of Public Service. I have heard the testimony here.

Q. Did you not, at my suggestion a few moments ago, look over the calculations of Mr. Bowen which he rapidly made to get the Rock Island back to grade; what would that connection between the Rock Island and the Wabash cost? Would that \$100,000 be ample?

A. I think that is fair and conservative. There would be no expense to the Rock Island for the Delmar proposition, not a dollar.

Mr. Bowen: Yes, that is true.

The hearing was adjourned to a further date to be fixed by the Commission.

[fol. 298] STATE OF MISSOURI:

PUBLIC SERVICE COMMISSION

Hearing held at Jefferson City, Missouri, November 14, 15, 16, 17, 18, 1921.

Present: John A. Kurtz, Chairman, Edwin J. Bean, Commissioners.

Appearances:

For the complainant, Messrs. Geo. F. Haid, Oliver Senti.

For the defendant, Wabash Railway Company, Messrs. N. S. Brown and Homer Hall.

For the defendant, Chicago, Rock Island & Pacific Railway, Messrs. Luther Burns, R. H. Ford and C. P. Richardson.

For the intervenor, West End Grade Crossing Association, Mr. C. H. Rodehaver.

For the defendant, Southwestern Bell Telephone Company, Mr. T. O. Stokes.

For the Commission, Mr. J. L. Harrop.

Mr. Stokes, for the Southwestern Bell Telephone Company, requested that he be allowed to put on his witnesses. Mr. Haid asked that some corrections be allowed in the testimony of Mr. Bowen be made at this time in order that the Commission be not deceived in considering the case; that a substitute exhibit be presented and accepted.

[fol. 299] It was agreed that the Southwestern Bell Telephone Company's request be acceded to, and that Mr. Haid be allowed later to place Mr. Bowen on the stand to make the corrections asked.

L. H. ROBERTS, sworn on behalf of the Southwestern Bell Telephone Company, testified as follows:

Direct examination by Mr. Stokes:

My name is L. S. Roberts. I am employed by the Southwestern Bell Telephone Company in St. Louis. I am plant engineer for

the States of Missouri and Arkansas. I have charge of the detail of working out the construction made necessary by the Wabash crossing at Delmar avenue, in St. Louis. I prepared an exhibit showing three plans in connection with taking care of our plant at the Wabash crossing on Delmar.

Said paper is marked "Roberts' Exhibit A."

Q. Explain that.

A. The Southwestern Bell Telephone Company maintains a subway on the south side of Delmar avenue, and one on the east side of Hodiamont, both of which are within the limits affected by proposed change in grade incident to construction of proposed overhead crossing on Delmar avenue, at the Wabash tracks. This subway is probably the most important subway we have in the residence district of St. Louis. They carry the bulk of the Cabanne subscriber cables and all of the inter-office trunks from Cabanne to all other exchanges in St. Louis; in the Cabanne exchange we have about [fol. 300] 12,000 telephones; in the neighborhood of 8,000 or 9,000 are carried through the subway affected by this improvement.

The cables in this subway are becoming congested, due to rapid growth of this particular section of St. Louis; if this improvement is long delayed, it will probably be necessary to add other cables; in fact, since this plan was first proposed, we have had to add another cable. This was recently completed. I have prepared what we have called "Plan 1." That is on page 1 to page 4 of exhibit. Providing a plan for maintaining and taking care of our plants and after completion of proposed improvement. This plan is based on the assumption that we will have to remove our present plant before the proposed construction work is started.

Q. This plan 1 is based upon the present plans of the City in regard to construction?

A. Yes, sir. The plan involves an estimated cost to the Telephone Company of \$80,000 gross, \$55,000 net. This estimate is a minimum estimate and it could easily be a good deal more than the amount stated; there are a number of contingencies that may be met which we cannot estimate. The temporary plant proposed by this plan is very susceptible to injury and damage, due possibly to high water, other people working in this vicinity, and several other causes. The plan contemplates temporary work to allow us to maintain telephone service during the course of construction of the improvement. From the City plans it appears that unless certain modifications are made, it would be necessary to remove our subway; first, the diversion of the channel of the River Des Peres will affect us, because our present subway is attached by iron pipes to the under-[fol. 301] side of the bridge now spanning this river; second, because the new channel is to be enclosed and our subway would pass through the proposed construction; third, the footings and piers of the viaduct proper at the crossing of the Wabash would be resting on our subway as the plan now stands. To clear these obstructions we have planned the construction of a temporary wooden trough. It is shown in yellow on the blue print.

Present construction is shown on the first blue print in red. Our construction consists of vitrified clay conduit with concrete top, and at frequent intervals manholes are built to provide access to the subway. The subway contains sixteen full-sized cables; that is, cables carrying all the way from three hundred to twelve hundred pairs of conductors. Under this plan this temporary trough would be constructed through the alley south of Delmar and across private property to clear the limits of proposed construction. In this trough would be placed necessary cable to replace those of the present subway. After the telephones now served by existing cables were re-routed through these temporary cables, the present cables would be removed and the conduit abandoned.

Q. In re-routing telephones through temporary cables, during the time it took to splice those cables, telephone service would be seriously interfered with?

A. Yes, sir; there would be considerable interference to the telephone service; the whole plan places a great hazard to the service during the entire time the viaduct is under construction. But during the entire period of construction of the viaduct, which probably will take a good many months, this temporary construction, of course, [fol. 302] is susceptible to damage of every sort.

Q. Very undesirable?

A. Yes, and very hazardous to the service of the Cabanne district. The cost of this work we have estimated, as stated previously, is \$80,000. Details of this estimate are shown on page 3 of the exhibit. This is a minimum estimate, and no material allowance has been made to cover possible contingencies such as flood waters, damage to other people working on the proposed improvement and several other things.

It also contemplates that no difficulty will be met in securing right of way across private property for this temporary construction. We have estimated the salvage at approximately \$25,000; this estimate is based that the present cables may be recovered in shape so that they may be re-used; if present cables are damaged in removal, the amount of salvage shown would be greatly reduced, as only the junk value would be obtained.

In addition to work outlined, it would be necessary to take care of an open-wire toll lead between the points affected by the improvement; this we estimate would cost approximately \$3,500 or \$2,000 net.

Q. That is what would be necessary according to the City's present plan?

A. Yes, sir; as it now stands.

Q. Have you anything practical to offer as a substitute for present plan of the City so as not to disturb their improvement?

A. Yes, we have prepared what we call Plan 2. This plan provides for a net expenditure, on the part of the Telephone Company, of approximately \$11,000, as against a minimum of \$55,000 on the other plan.

[fol. 303] Plan 2 assumes that this apparent conflict can be avoided; first, by properly supporting through temporary piers and

by concrete encasement the present pipes attached to the bridge now crossing the River Des Peres, this to allow then of the filling in of the old river channel without injury to our plant. I think that feature could be handled very readily without very great cost. That is, we would support our cables there pending their filling in the old channel of the river and building through new culverts.

Second, the possibility of modifying the plans for the enclosure of proposed new river channel so as to permit our subway to pass over the top of same.

Q. In what way could that be done, or what is the present subway plan?

A. The second blue print of the exhibit is an elevation of Delmar at points affected by the improvement work; our present subway is shown in red; it is approximately from thirty inches to three feet below present grade, and it would pass through the arch of the proposed culvert about as shown; it would also pass under the footings of the viaduct over the Wabash as shown on second blue print.

Q. What have you to offer under Plan 2; in the first place, how could the matter of the culvert be remedied?

A. There are two or three things that might be done. The culvert might be flattened out so as to permit our subway to pass over the top of it, maintaining, of course, the same area in order to carry the flow of water under which the culvert was calculated.

Q. Are there any places in the City of St. Louis where that has been done?

A. Yes, during 1913 and 1914 the City constructed a sewer, a [fol. 304] rectangular cross section on Palm street and Florissant avenue to Twenty-fifth street; this sewer occupied the entire width of the street from curb to curb, being 34 feet wide; this sewer had a flat top, I presume, supported by beams and reinforcement. I am not familiar with the construction details of the sewer, except that it had a flat top and rectangular cross section and about thirty-four feet wide. Some such method as that might prove feasible.

They might widen out the culvert and make a combination arch and flat top to it so as to allow our subway to pass over it; possibly they could make a wider culvert with a double arch with a top.

Q. They could still maintain the arched character of construction of the culvert if they would widen the culvert and make the double arch instead of single arch?

A. It appears to me that could be worked out.

Q. In regard to avoiding the bases of the columns supporting the viaduct, how would you remedy that without upsetting the City's plans?

A. It might be possible to change location of footings to some extent or possibly arch over it, but I don't believe there would be very much change involved in the City's plan to eliminate this feature.

It appears it would be possible to move the location of the pillars slightly so as to escape our subway. I believe it would be possible, even in present location, to arch over our subway so that our subway would not bear any of the weight.

Under Plan 2, we would either *either* brick up our manholes or concrete them; that is, we would build a brick or concrete well from the surface of the present street to the surface of proposed [fol. 305] viaduct; we would allow our present cables to remain as they are; we would construct a new subway in new viaduct at proposed grade and place all future cables through new subway.

Q. The cost of constructing that new subway is included in your \$11,000?

A. Yes, some of the cost would be incurred in future years, in any event, whether the improvement was made or not.

Q. Under Plan 2 you could let your cable remain and wear out thereby utilizing your present plan?

A. Yes, it would allow us to utilize present investment and plant. This type of construction was used in Kansas City in connection with the improvements on the new Terminal Union Depot at Kansas City, where they made some fills of viaducts and it was necessary to wall up the manholes about fifteen or twenty feet.

Q. Plan 2 eliminates a serious hazard involved under Plan 1; we allow our cables to remain just as they are, no interruption of service?

A. No, and it is not susceptible of the injury and accidents as it would be under temporary method outlined in Plan 1, other than the workmen working in the vicinity and would save us fully \$40,000, probably considerably more than that.

Plan 3 is an alternate plan combining certain features of Plan 1 and Plan 2; it assumes that the work contemplated by the City and that necessary on the part of the Telephone Company can be arranged so as to temporarily retain our present plant until the completion of the new subway. We would leave our present sub-[fol. 306] way and cable as it is; the City would construct a viaduct, we to place the new conduit, run new cables in new conduits and remove old cables and abandon old subway.

It is estimated that this plan will involve a gross expenditure of \$51,000, net expenditure of \$43,800.

This plan is open to some of the objections to Plan 1, excess expenditure required; also there is more hazard to the service than under Plan 2, although not quite as much as under Plan 1. In all three of these plans it will be necessary to take care of the toll line mentioned, the cost being the same in all of the plans; that is, about \$2,500 net.

Mr. Stokes: I would like to introduce by reference our answer to the complaint of the E. Colmore Rogers' complaint in regard to the service and lack of facilities, only for the reason to show what the Commission already knows; that we are congested in this particular section of the City and we need to spend probably \$3,000,000 in St. Louis in the very near future to get the plant we need, so that an expenditure of \$44,000 is greatly to the interest of St. Louis as well as to our interest that it would be saved. That case has no number that I have been able to find; it is an informal complaint.

The Chairman: Do you want to have that marked as an exhibit?

Commissioner Bean: No. Introduce it by reference.

(Which is accordingly done.)

Cross-examination by Mr. Burns:

Q. In case it should be necessary to separate these grades at Delmar, and the Commission should see fit to order the separation [fol. 307] by elevating the railroad and leaving the street substantially at present grade, is it not a fact that that will do away with all the expense to your Company?

A. Yes, I believe that will entirely eliminate all our troubles.

Mr. Senti:

Q. The Bell Telephone Company is in favor of having the grade separated by depression of tracks, are they not, south of Delmar?

A. Depression of tracks would seriously affect us, because we would have no means of taking care of our subways; that would go right through our subway; our subway is about three feet below that.

Q. I don't mean that; I mean south of Delmar, towards Union avenue, leaving the tracks at their present elevation at Delmar, which would necessitate the depression of tracks southwardly, should the grade crossing there be separated in the future, your company is in favor of the adoption of that plan?

A. I wouldn't want to say offhand; I don't think it would affect us materially.

Q. As a matter of fact the president of the Bell Telephone Company, at the prior hearing, testified in favor of adopting the City's plan, did he not?

A. I am not familiar with the testimony at previous hearing.

Q. Have you made any calculation as to additional cost to the City or to whoever must eventually pay for the construction that would result from the adoption of either of the substitute plans you have mentioned?

A. No sir; I have not. The item of \$8,000 in Plan 2 has reference to the construction of a new subway at the new grade of proposed viaduct; if the viaduct is built, we would want to construct a subway in the viaduct, preferably in the south sidewalk in order to take [fol. 308] care of future cables, we would want to do that in any event.

Q. Whenever it became necessary to lay additional cables, you would have to do that to provide for the additional room?

A. Provided the viaduct project went through; we have spare facilities in present subway that would last us a number of years, but we wouldn't want to with the viaduct constructed, pull additional cables into present subway; it would be too inaccessible and the work would be too hazardous. The idea is to provide for future years. What it means is the expenditure of that \$8,000 several years before it would otherwise be required.

Q. Under the terms of your franchise, facilities of that kind are to be paid for by the Bell Telephone Company?

A. This \$8,000; I presume so.

Mr. Hall:

Q. Mr. Roberts, does your company have any conduits or cables crossing Union avenue or Lindell, or any of the streets between Lindell boulevard and Delmar boulevard?

A. We have a conduit running on De Baliviere that crosses Lindell and goes into the park; we also have a conduit run on Union, but I don't think that crosses Lindell. Those that I have mentioned on De Baliviere and Union cross the right of way of the railroads there.

Q. In the report you have prepared and investigation you have made, have you taken into consideration the fact that this plan proposed by the City would determine the method of grade separation at the streets south of Lindell boulevard, including Union, De Baliviere and Lindell?

A. Not very much in detail, no. I don't positively know the effect the separation of crossings at those streets south of Delmar [fol. 309] would have upon our company's properties if the City plan were adopted and put into effect, but I am of the opinion that we would not be materially affected.

Q. If the railroad was put in a cut 23 feet at De Baliviere, would that affect your company's properties?

A. Yes, that would affect us at De Baliviere.

Q. You have not made any estimate as to the effect it would have of the cost to your company of interference with its operations, have you?

A. No, other than we haven't anywhere near the plant involved that we have on the Delmar and Walash crossing. I have not prepared any report going into detail as to the effect on our property or the cost. I am merely giving my opinion without investigating that the cost would be less. I am sure it would be less at each of the streets where the separation is affected by the City's plan. I do not at this time know what the total cost would be at those various places. That would require an investigation and careful calculation such as an engineer would make.

With reference to proposed change in the top of culvert over River Des Peres at Delmar, I suggest instead of having an arched culvert, the top of the culvert be flattened.

Q. What would be the difference in the height of your conduit if it were put in over the curved top instead of over the flattened top, as you propose?

A. Roughly, about ten feet; the conduit is already in place; what we want to avoid is the necessity of moving it; to move the conduit involves the construction of a new subway, running new cables and splicing same and cutting of the telephones through the new cables [fol. 310] and the abandonment and pulling out of old cables. In

telephone work it is necessary to keep subscribers working at all times; you can't make an out of service job on a job like this.

My plan proposes that the top of culvert over River Des Peres at Delmar be lowed about ten feet over the top of the arch of the plan shown by the City. I propose the reduction in height of culvert be compensated by extending the sides, widening.

Q. Do you contemplate that that should be compensated by deepening the culvert any?

A. I did not, although that might be a possible solution to it. As far as the Telephone Company is concerned, they are not particularly interested in what method is applied other than to accomplish the result of allowing our subway to cross the top of it. I am not interested in method applied, so we get a flat top and do not have to move our conduit.

Q. This proposed change in the top of conduit suggested in your plan, is in your plan that that change be made only at Delmar, at where your conduits cross?

A. It might be desirable to make it all through the enclosure, but as far as we are concerned, it wouldn't make any difference to us if they were only made where our conduits cross. Our plan only contemplates that this culvert be flattened at Delmar where our conduits cross.

Q. You propose to take the City's arched culvert and, at Delmar, run bridging across the 10 feet below the place that your conduits would otherwise go?

A. No, there would have to be certain modifications made in their plans at both sides of Delmar to function their construction with flat top. I have not worked out any detail of the method of accomplishing this.

[fol. 311] I have not considered whether my plan of lowering the top of the culvert and widening the sides is practical as a part of this entire plan of grade separation and water control; we just merely offer that as one possible suggestion, not having worked out all the construction details involved in it.

Q. Your idea was that the City's plan, as submitted, places an unnecessary and excess cost on the Bell Telephone in accomplishing that separation?

A. Yes, sir.

Mr. Stokes:

Your suggestion was not confined to one type of construction, the flat top, but it is possible to do this also with a double arch, is it not?

A. It appears that it would be, yes. If a flat top is not practical, a double arch might be.

Privilege granted to recall witness.

Mr. Stokes: I suggest it might save time for everybody if there are any serious objections to this thing that our engineers get together; that is the way we usually handle these things. It is something our engineers should work out in a practical way.

Mr. Senti (Q.): The method that has been suggested, is that the usual plan adopted by the City and your company?

A. Yes, sir.

L. R. BOWEN, resumed.

Mr. Senti (Q.): Mr. Bowen, you have some corrections it is proposed to make in the record. Will you state to the Commission just what those corrections are?

A. The record of the testimony in this case wasn't given to the City until several months after the hearing, and I have checked over carefully the testimony as recorded and find a number of [fol. 312] things that we consider errors in the record, and two or three cases of omissions in the record. These proposed corrections are all in my testimony, with one exception: Mr. Hemmelmann was employed by the City as an expert on real estate values to tell what the damage would be to abutting property caused by proposed changes in grade of Delmar boulevard; also to tell what the damage would be by carrying out the ultimate scheme of depressing the track south of Delmar, and elevating the tracks north of Delmar; he filed a written report which is Exhibit No. 32 in this case, stating amount of damage of different streets, and also total amount of damage for the entire project; in the testimony the amount given as net damage at Delmar is the amount shown on his report as the total damage for entire project; we wanted to change that sum to correspond with his report. We are not sure that the sum was correctly reported or whether he made a mistake in stating that sum, but it disagrees with his report as to the amount at Delmar and corresponds with his report as to the total damage for the entire project. That is Exhibit 32. The amounts are correctly stated in the report.

The corrections desired to have made in the record are shown on these two statements, one entitled "Corrections in Record Hearings of February 21st and 23rd, 1921," and the other entitled "Corrections in Record of Hearing of March 23rd, 24th and 25th, 1921." Copies of these have been furnished to the attorneys for the railroad company.

Witness read into the record City's Exhibit 101, being list of corrections for the hearing of February 21st and 23rd.
[fol. 313] Q. That is your testimony, is it?

A. Yes, sir; that is my own testimony. The list for the hearing of March 23, 24 and 25 is very long. Do you want me to read the entire list?

The Chairman: I suggest if you have it in the shape of an exhibit, just file it.

Mr. Senti: Very well; then the Commission can allow such other corrections as they deem proper.

(Said document was marked "City's Exhibit 102.")

The Witness: In the hearing we filed in this case an Exhibit No. 41 which was intended to show all the vertical clearances of bridges and other structures in the Cities of New York, Chicago, Philadelphia, Detroit, Cleveland, St. Louis, Boston, Pittsburgh and Buffalo. At the time this was submitted, we drew attention to the fact that the work was not complete for the City of Baltimore; since that time we have completed the work for the City of Baltimore, and in checking over this exhibit, we have found minor mistakes in the City of St. Louis and the City of Pittsburgh, and they have been corrected and we would like to submit this in lieu of Exhibit No. 41.

(Said Exhibit was marked "City's Substitute Exhibit No. 41.")

A. I have checked over the figures since the former one was submitted, and I am satisfied the corrections, as appear here, are correct.

W. W. HORNER, recalled.

Mr. Senti:

Q. You have testified in this case before, and you have a substitute there for a part of one of the exhibits. State to the Commission [fol. 314] what that is, and why it is desired to file it at this time?

A. This relates to an amendment to Exhibit No. 82. In the City's plan for the elimination of the grade crossing at Delmar by constructing a viaduct with the street and leaving the tracks at present grade, there is included a culvert under Delmar to carry the flow of the River Des Peres and replace present Delmar bridge; there is no other change in drainage involved in this plan; realizing, however, that the adoption of this plan will affect the disposition of the grade crossing south of Delmar the City has shown that with the construction of proposed River Des Peres sewer, the tracks may be depressed and drained into the sewer without involving any particular difficulties, and does not propose to suggest depression until the River Des Peres sewer is built; as an outside contingency, and in the event that a depression or portion of it were ordered and carried out before the River Des Peres is built, the City showed a continuation of this culvert under Delmar, which would extend southwardly to Kingsbury, and on the basis of the construction of that extended culvert presented, Exhibit 82, as a demonstration of the high water which would occur in the River Des Peres under those conditions.

The City is now amending Exhibit 82 by showing the construction by the City, not as a part of the grade elimination plan, of a continued culvert past Kingsbury to Waterman avenue, and amends Exhibit 82 the demonstration of the probable water levels after this construction by showing that the water would then not rise north of [fol. 315] Delmar to an elevation of 83, as originally indicated, but to an elevation of 80.1.

(Said document is marked ("City's Substitute Exhibit No. 82.")

Mr. Brown: I feel that the railroads, as far as the Wabash is concerned, must object to change at this time in the City's plans. We have proceeded for many months upon the plan which the City introduced here, and we have all appreciated the fact that the flood control situation was one of the serious elements in this case; we have employed the most eminent expert engineers that we could obtain in the country to investigate this situation and report upon it in accordance with the plan which the City introduced here before this Commission at the principal hearing of this case by the City, and now the City comes along and says that their plan is shifting; this plan for flood control of the City is a good deal like the sands of the Missouri—they shift from time to time, and we are now confronted with an entirely new proposition on flood control, and these defendants have had no opportunity whatever to make any investigation, and our expert witnesses who have examined into this question have not had this question before them for consideration; it seems to me it is entirely too late for the City to come in and amend their plan for the flood control of this district.

The Chairman: We will allow it to go in at this time, and if the Commission, in conference, decides to eliminate that part of it, we can do so later.

Mr. Brown: I assume if the Commission decides to admit it, the defendants will be given reasonable opportunity to reconduct our [fol. 316] investigations and retry the case on the basis of these new plans.

The Chairman: Oh, yes.

Commissioner Bean: What change is being made here?

Mr. Senti:

Q. As I understand the change, it merely contemplates the extension southwardly of the culvert from Kingsbury to Waterman, the distance of how many feet, Mr. Horner?

A. About 300 to 500 feet southwardly from where it was proposed to terminate the culvert south of the bridge.

Mr. Senti: It is not a part of the Delmar plan, as Mr. Horner stated; it is an independent plan.

Mr. Brown: It is the flood control of the River des Peres.

Mr. Senti: It is additional precaution to eliminate any danger that possibly might exist as a result of the Delmar plan.

The Chairman: All right, proceed.

Cross-examination by Mr. Brown:

Q. Do I understand you are not offering this as a part of the City's grade separation plan?

A. This is a piece of work which it is proposed to be done by the City aside from its interests there; not a part of the expense of eliminating the grade crossing.

Q. You are filing it merely as a matter of information to the Commission?

A. As of the City's intentions; yes. It is a proposal of what the City intends to do in the express event of the depression to the south before the complete River des Peres sewer is built. This improvement has not been passed upon by the City by ordinance. I don't [fol. 317] think it can be considered a strictly legal basis; it is simply a part of the general reconstruction and eliminating that may be brought out.

Q. On what basis does this offer that you are presenting here, what binding basis has it either upon the Commission or upon the City or on the railroad company? Does it have any at all?

A. That is a legal matter beyond my understanding; it is simply the City's proposal at this time.

The Chairman: The engineering department of the City, is that it?

A. Yes. It is a proposal that the City will do it in the event that I have outlined.

Mr. Senti: I take it there is no doubt but what the city will do it, because we concede the power of the Commission to authorize us to do it.

Mr. Brown: I don't see why, if it is not a part of the plan.

Mr. Senti: Still we concede the Commission has the power to make such an order if they choose to impose the condition, we are perfectly willing to comply with it.

Witness is excused and Mr. Senti states he has nothing further.

Mr. Brown: Mr. Chairman, the Wabash and the Rock Island Railroads have here today a number of eminent engineers to testify on this question: appreciating the fact that the drainage question of the River des Peres flood proposition is one of the important elements in this case, we thought we ought to beg the indulgence of the Commission and perhaps depart from the logical order of defendant's case and hear these expert witnesses in the beginning.

It was the understanding at the close of the City's case that the [fol. 318] defendants should have the privilege of recalling certain of the City's witnesses for cross-examination, and logically we should at this time complete our cross-examination of the City's witnesses; the only witness of the City, however, I think we desire to recall for cross-examination is Mr. Bowen, who is present, and I should like the indulgence of the Commission to waive that at this time and take the witnesses of the companies' experts, with the understanding that their testimony may be written up by the reporter, if that may be done, after the cross-examination of Mr. Bowen.

The Chairman: I don't know that that will make any material difference because you are recalling Mr. Bowen, and when you do recall him, it will show what he is recalled for. You may proceed.

Mr. Hall: At this time, on behalf of the Wabash Railway Company, I wish to move that this complaint and further consideration of it be dismissed by the Commission for the reason that under the evidence as shown on behalf of complainant and under pleadings in this case, the Commission is without authority of law to proceed

further in the hearing upon the issues involved, and is without authority to make any order as prayed for in the complaint, or any other order in connection with the proposed separation of the grade crossing at Delmar and the Wabash tracks; we move that the complaint be dismissed for the reason that the Wabash Railway Company has certain vested rights in its right of way which would be affected by the proposed change, which it holds under contract and grant, and such rights would be impaired and violated by proposed change of grade, contrary to the provisions of Section 10 of Article I, [fol. 319] of the Constitution of the United States, and this defendant would be deprived of valuable and lawful rights and privileges and its property would be thereby taken and damaged for public use without just compensation, in violation of Article II, Section 21 of the Constitution of the State of Missouri, and it would be deprived of its property without due process of law in violation of Article II, Section 30 of the Constitution of the State of Missouri, and would be denied the right of trial by jury on its claim for compensation for its property to be taken and damaged, contrary to Article XII, Section 4 of the Constitution of the State of Missouri, and would be deprived of its property without due process of law and its property would be taken for public use without due compensation contrary to Article V of the Amendments to the Constitution of the United States, and it would be deprived of its property without due process of law, and would be denied the equal protection of the laws contrary to Article XIV, Section 1 of the Amendments of the Constitution of the United States.

Objection overruled.

Mr. Burns: The Rock Island would like to join in the motion as entered by the Wabash so far as applicable to it, and also as application to its vested rights to use the tracks from the north line of Forest Park to Eighteenth street under decree of the Federal Court in the case of Central Trust Co. v. the Wabash, as set out in our answer.

Objection overruled.

[fol. 320] TESTIMONY FOR DEFENDANT WABASH RAILWAY COMPANY

N. JOHNSON, being duly sworn, testified as follows:

Direct examination by Mr. Brown:

I am a civil engineer employed by the Wabash Railway Company; have been in engineering work about twenty years; am at present engaged in the engineering features of the Federal valuation work.

Q. How long have you been connected with the study of the grade separation question centering around Delmar avenue in St. Louis and the territory north and south of that avenue?

A. Since 1914. I have given study and consideration to the

plans of the City of St. Louis which have been introduced in this case. Those plans are in two parts; first, the plan for the viaduct over the Wabash right of way and tracks at Delmar avenue, which plans include a change in the River des Peres and the enclosure of that river in a solid culvert.

I have examined the testimony of Mr. Horner containing certain engineering data with respect to the flood conditions as they were brought about in the flood of 1915.

Q. Have you taken the data furnished by Mr. Horner and made a plat or map showing the territories flooded by the 1915 flood under [fol. 321] the conditions as they now exist with respect to the railroad tracks, crossings, etc.?

A. Yes, sir. I have with me a geological map of the Geological Department of the United States. That map shows the drainage area of the River des Peres in the City of St. Louis. I have outlined on that map that drainage area in red. There are 18.7 square miles included in that drainage area.

Q. How many acres is that?

A. It is shown at the top of the map there, 11,962.

Q. That area is all in the City of St. Louis or is it partly in the city and partly in the county?

A. It is mostly in the county. Delmar avenue crosses the western city limits a short distance west of the River des Peres crossing. The city limits are about between 6200 and 6300 west. The drainage area shown on the governmental geological map is the area in the county and in the city. The average grade is approximately six-tenths of one per cent slope.

(Map is marked "Wabash Exhibit 1.")

Q. Mr. Johnson, going back to the map which you have prepared to show in a graphic way the flooded area occasioned by the 1915 flood under the conditions as now existing as to the railroad track crossing, etc., will you produce that map and have it marked "Wabash Exhibit 2," which we will introduce at this time?

Which is accordingly done.

The Witness: The dark green outline of map shows the area submerged under the 1915 flood; that is based on the observed height of water and by following that contour, platting it on the ground and afterwards platting it on the map, consisting of 84 acres. [fol. 322] Q. Where did you get the data from which the contours were run?

A. That was observed height of water that we made and that elevation corresponds very closely with the City's report, being 78, City datum corresponding to 491.54 Wabash datum. That map shows only the flood areas at Delmar north thereof and does not show the flood condition in the Wabash right of way south of Delmar. It shows only what was flooded north of Delmar. The light green coloring shows flooded area with the water raise at elevation City datum 83.5, Wabash datum 497.0, elevation 83.5 is the height that the water would be raised to under City's plan for provid-

ing for building culvert under Delmar, which is part of their plan of Delmar Viaduct, which is shown in City's Exhibit 82, pages 3 and 4, and would cover 208 acres. This outline was determined same as the first one by following the contour on the ground, the contour 497 Wabash datum or 83.5 City datum, and then platting it on the map.

Q. The outline showing flooded area of 208 acres is the 1915 flood controlled by the City's plan for the separation of grades at Delmar avenue?

A. It is what we would expect with a recurrence of that flood with these improvements made that are proposed by the City.

Q. I believe you prepared a map showing separately the 1915 flood if the improvements called for by the City's viaduct plan at Delmar were carried out?

A. Very much the same map, except it does not show the 1915 [fol. 323] flooded area, a smaller map, and a little easier to understand.

(Wabash Exhibit No. 3.)

Q. This shows the same information as indicated by light green outline on Wabash Exhibit 2, doesn't it?

A. Yes, shows a little more the details of that; in black figures you will find inside of this depth of the water that would occur at this flood state.

Q. Will you give us some of that data?

A. There is the first one north of Delmar is 8.5 and 8.00, that is in the Polar Wave's yards, and across the line over in University City there is a height of 3.5. That 3.5 means the depth of the water.

Q. On this map you have shown the flood conditions as they would exist if the City's plan were carried out, if the Delmar Viaduct were constructed and if the Wabash tracks were elevated north of Delmar avenue to a point across the Olive Street road?

A. It is the area that would be flooded if the water was shut off from the Wabash right of way and confined to the proposed Delmar avenue conduit. On this map we have assumed the construction of the viaduct on Delmar and the elevation of the Wabash tracks north of Delmar.

I understand that the City only proposes at this time to construct a viaduct on Delmar avenue.

Q. There is no present contemplation on the part of the City to separate the grades north of Delmar avenue by the elevated structure, is there?

A. Not immediately.

Q. If you take this map of your, Exhibit 3, and take off of that map the elevated embankment north of Delmar and put the tracks [fol. 324] in the condition that they now are and as they were in 1915, with the proposed viaduct constructed on Delmar, what would be the effect of all of that vast volume of water being concentrated into the opening of the viaduct through which the Wabash tracks extend?

A. Under the same flood conditions we would have a washout; tear the tracks to pieces. It might even damage the Wabash viaduct foundations; I mean the Delmar foundations.

Q. Would there be any outlet for the water south, the backwaters south, other than the channel occupied by the railroad tracks under the proposed Delmar viaduct?

A. No, it would be that and what the river would take.

Q. If the water is in excess of what the river would carry, the only way they could get out would be down the Wabash right of way?

A. Yes, sir.

Q. And if the City plan for depressing the tracks south, that is a grade of eight-tenths of one per cent south of Delmar, if the tracks are depressed, isn't it?

A. Yes, sir. The effect of those waters running in there would flood the tracks; it would suspend traffic; it would be liable to wash out the tracks. That would destroy the railroad.

Recess taken until 2 p. m.

Testimony of N. Johnson resumed

Mr. Hall:

Q. With your permission I will introduce some photographs. Mr. Johnson, you have some photographs of the 1915 flood showing [fol. 325] views in and above the Delmar crossing neighborhood, haven't you?

A. Yes.

Q. Will you take them up in the regular order in which you have them there and explain the point from which they were taken and the view shown, etc?

A. The first one is a photograph taken showing the upstream side of the Kingsbury Bridge at or about the height of the flood.

(Said photograph is marked "Wabash Exhibit 4.")

That was taken August 20, 1915, and it shows the upper side of the Kingsbury Bridge. The point about that photograph, I wish to especially direct attention to, is the fact that the water was backed up and not sufficient opening afforded for the water to pass through. This is the Kingsbury Bridge. It is south about what is equivalent to three short blocks. The next photograph shows the lower, the down-stream side of the same bridge.

(Said photograph is marked "Wabash Exhibit 5.")

It shows the down-stream side of Kingsbury Bridge at the same time.

Q. Taking the two photographs together, what point do you make?

A. That there was a heaving up of the water at this bridge amounting to approximately three feet. That is, the water was three feet higher on the up-side of the bridge than it was on the down-stream side. The next one shows a view taken looking north

from a point near the Kingsbury Bridge taken at the time of the high water, showing Wabash Depot on the left background. That is Delmar Station. It shows the course of part of this water going down the Wabash right of way.
[fol. 326] Offered as Wabash Exhibit 6.)

This picture is to indicate that the Wabash right of way was flooded and acted as an overflow for the River Des Peres' drainage. There were two channels to take the water off, one the River Des Peres and the other the Wabash Railway.

We have one photograph here showing the Hamilton crossing.

(Marked "Wabash Exhibit No. 77.")

It indicates that at the Hamilton crossing the water was about six or seven feet deep. That is on the Wabash tracks; this picture is looking northeast from the south bank of the Wabash right of way. That water extended east on Delmar almost to Hamilton avenue at that time. It extended west of the tracks on Delmar to a point west of Rosedale avenue.

Q. It was of sufficient depth to entirely submerge that bridge over the River Des Peres on Delmar avenue, wasn't it?

A. All except the top of the railing.

How wide was that flood area measured along Delmar avenue, the submerged area, what distance from the east toward Hamilton avenue to the west beyond Rosedale avenue?

Q. It was of sufficient depth to entirely submerge that bridge over the River Des Peres on Delmar avenue, wasn't it?

A. All except the top of the railing.

Q. How wide was that flood area measured along Delmar avenue, the submerged area, what distance from the east toward Hamilton avenue to the west beyond Rosedale avenue?

A. Possibly 1,000 feet. The flooded area extended north as I have shown on maps, Exhibits 2 and 3.

Cross-examination by Mr. Senti:

Q. What is the scale of the Government map which you introduce as Exhibit No. 1?

A. I don't know offhand; it is marked on the map, however. (After examination): The scale is represented by the fraction one over 62,500. It means 1 foot on the map would represent 62,500 [fol. 327] feet on the ground. The difference in the elevations between successive contour lines is 20 feet.

My Exhibit No. 1 shows the watershed there.

Q. How did you arrive at the area of the watershed?

A. Scaled it off the map, off the line showing the top of the watershed which had been traced out on the map through the contours. There are approximately twelve contour lines come within that area.

Q. Does the outline that appears on the exhibit there represent the area of the watershed north of Delmar?

A. Yes, and south of it, not only north of Delmar, there is south of that coming in from the south of Delmar. In the neighborhood of a square mile, approximately.

I did not make an actual survey of the watershed. As a matter of fact, the area could have been accurately determined by an actual survey, possibly.

On Exhibit 2 are the areas which show results of actual surveys.

Q. Do you know whether the tracks of the Wabash Railroad were flooded at any other point besides Delmar avenue on the 20th of August, 1915?

A. Flooded all the way down to De Baliviere. I don't know whether they were flooded in East St. Louis or not. They had trouble in the vicinity of Ferguson; I don't know whether they were flooded or not.

I do not know any railroad entering the City of St. Louis whose tracks were not flooded by the storm of 1915.

Q. As a matter of fact the tracks of every railroad west of the Gulf of Mexico were flooded in places in the line of that storm, were they not?

A. I couldn't say.

[fel. 328] Q. It was at least a very general flood condition, was it not?

A. I don't know what part was flooded.

If Delmar Viaduct is built according to the City's plan and we should have a recurrence of a storm similar to that of August 20, 1915, the mere construction of the Delmar Viaduct according to plan presented by the City would not of itself produce the conditions indicated on the map without the protection walls that the City proposed in connection with the full development of track separation north of Delmar.

Q. One of the conditions that has not been considered in arriving at the results shown on plat here is the building of the River Des Peres sewer, is it not?

A. That has been considered; I mean the River Des Peres under Delmar only.

Mr. Brown:

Q. That is shown by the City's plan?

A. Yes, the City's plan submitted last spring.

Mr. Senti:

Q. You don't mean, you say, that this condition would obtain if the River Des Peres sewer was constructed?

A. I am not prepared to say; we haven't had sufficient time to work that matter out. Another element we have taken into consideration in arriving at the conclusion shown by this exhibit is the elevation of the tracks of the Wabash Railway, northwardly from Delmar.

Q. That in itself is not a part of the building of the Delmar Viaduct, is it?

A. It is a part of the City's ultimate plan for grade separation. The Delmar Viaduct is only a part of the grade separation scheme. The elevation of the tracks northwardly from Delmar is not a part of the construction of the viaduct itself. It is an extension of the project. In the extension of that project taking in the elevation [fol. 329] of the tracks northwardly and their depression towards the south the River Des Peres sewer might be built and relieve the condition portrayed here by this exhibit, possibly.

Q. If the viaduct were constructed in the manner shown by the plans prepared by the City and in the manner in which we are now asking that it be constructed, how would that affect the water levels that you have shown on this exhibit?

A. It would possibly lower them somewhat on account of the relief that you would get under the Delmar Viaduct in the way of the Wabash tracks.

Mr. Brown:

Q. You mean the tracks will carry the water?

A. Yes, the overflow, the same as it did in 1915.

Mr. Senti:

Q. That condition exists at the present time, does it not?

A. Not the same as they would be with the viaduct there.

Q. In what manner would you say that the condition with reference to the eaves, if the water could be carried off would be changed by the construction of the viaduct alone?

A. The Wabash tracks would still afford some relief to this water.

Q. Why wouldn't they afford the same relief in that event that they did in 1915?

A. Because you are planning to narrow up the passageway from possibly 1,000 feet to maybe 50 feet or 60 feet. That condition would not be compensated by changes that are contemplated in the channel of the River Des Peres, at that point. The Wabash right of way is 56 feet. The channel through the Wabash cut was possibly two or three hundred feet wide; it overflowed other lands besides the Wabash right of way.

[fol. 330] Q. Would that overflow of that adjacent 200 or 300 feet of which you speak be prevented by the change proposed by the erection of the viaduct alone?

A. Yes, it would restrict it, the opening through the viaduct.

Q. To what extent do you say that would affect the level to which the water would rise towards the north?

A. We have never figured that out because that was only part of the project. Our calculations are based upon the completion of the project proposed by the City, before the construction of the River Des Peres sewer. I don't recall just how wide that cut is. Our right of way is 56 feet wide and there is low ground on both sides of it. I could not say offhand to what extent that condition exists on both sides. I have never made any measurements myself to determine

that except I know there is a strip of low ground each side of the right of way down which this water went. I know positively it is wider than 76 feet. That would leave approximately 20 feet on each side of the right of way; it is irregular through there; it is not uniform.

Q. Then, as a matter of fact, it wouldn't be 200 or 300 feet wide?

A. Possibly not; at Delmar it is a good deal more than that.

Redirect examination by Mr. Brown:

Q. The City has seemed to emphasize the fact that your elevation shown on your Exhibit 3 of the Wabash tracks north of Delmar is not contemplated in the City plan for the Delmar Viaduct. It is a fact, however, isn't it, that the Delmar Viaduct is but a single unit of the City's plan for grade separation?

A. That is my understanding, only a part of the project; it is the [fol. 331] immediate part. That is shown by the exhibit itself that the City has filed in this case. Whatever viaduct is built at Delmar is conceded that there must be elevation of the tracks, if any grade separation obtains north of Delmar. If there is any subsequent elimination south of Delmar, it must be by depression if the viaduct is erected at Delmar avenue according to the City's plan.

Q. Mr. Senti seemed concerned about your statement that with the viaduct constructed these overflow waters would be concentrated through the opening in the viaduct which spans the Wabash tracks, which is 56 or 60 feet. That viaduct as the City proposes it is constructed on earthen approaches, isn't it; that is, the approaches to that viaduct are solid earthen embankments?

A. Yes, sir.

Q. The full width of Delmar avenue, 100 feet?

A. I understand it so.

Q. That approach on the east begins approximately 300 feet east of Delmar, doesn't it; east of Delmar crossing?

A. It is farther than that; it is up near Hamilton. On the west it begins, I should say, 100 feet west of Rosedale. The embankment of Rosedale is 60 or 70 feet above present grade of Delmar. If you take all of that water shown in photographs and in your Exhibits 2 and 3, those embankments stand as a dam against that water; there are only two outlets provided, one the River des Peres, and the other the opening in the viaduct spanning the Wabash tracks. Those two openings must of necessity furnish the overflow outlet for all those backed up waters.

Q. What percentage do you figure of the overflow waters went down the Wabash right of way during 1915?

A. We figure at least one-third of the total.

[fol. 332] Q. If this City project goes through with this viaduct over here, will that percentage that will be cast onto the Wabash right of way be increased or decreased, assuming a like flood condition?

A. I couldn't say how that would be distributed under this partially constructed plan.

Mr. Rodehaver:

Q. I don't believe I heard you say how deep the water was over your tracks at Delmar at the time of that flood?

A. About four feet.

Q. Was there any vehicular traffic on Delmar avenue during that flood?

A. No, river traffic. The water commenced to go over our tracks about 9 o'clock in the morning and the flood receded some time about the middle of the night; I don't recall just when. It started to recede in the late afternoon, but the flood was down to the level of Delmar avenue some time either late in the night or early next morning. About a day's interruption. From nine in the morning until next morning some time. Delmar avenue is the main east and west thoroughfare in that vicinity.

Q. As the engineer for the Wabash you are more or less familiar with their trackage facilities in St. Louis?

A. Somewhat. I said the track was put out of commission at that place by this flood. We did not run any trains at all out of St. Louis during the flood; they detoured them down to the north. We have another way in and out of St. Louis besides this. It interfered with traffic.

Mr. Brown:

Q. While the vehicular traffic on Delmar avenue may not have been interrupted more than twenty-four or twenty-eight hours, it is a fact, so far as the Wabash trains were concerned, they went out of commission on the morning of Friday, the 20th, and they didn't [fol. 333] run any trains in there until the following Sunday?

A. They were out of commission for two or three days on account of necessary repairs to the tracks after the waters had receded.

Q. So that the recession of the waters didn't restore a condition under which you could operate your trains, did it?

A. No, sir; we had a work train there for three days repairing tracks.

Q. That line is a very busy line, so far as Wabash traffic is concerned?

A. It is especially for passenger business. The fact that it was out of commission during all these days naturally had the effect of very seriously disorganizing the traffic.

Mr. Rodehaver:

Q. We are not to infer from those remarks that it was this piece of track entirely that put your line out of commission? Your line might have been out of commission on account of washout up near the Missouri River or north of the Missouri River or over in Illinois. You could have operated in and out of St. Louis over your northern line?

A. Yes, we could have and I expect we did detour. We can do it over foreign lines if we have to.

C. B. BURDICK, being duly sworn, testified as follows:

Direct examination by Mr. Brown:

I reside in Chicago. I am a member of the firm of Alvord & Burdick, hydraulic and sanitary engineers. That firm has been in existence about twenty years. I have been a member of that firm for that length of time.

Our work has been largely in connection with hydraulics, relating [fol. 334] to water supply, drainage and flood protection; during the past twenty years we have been into 100 or more local tests in problems relating to hydraulics and drainage.

Q. Can you tell us some of the more important projects that you have been interested in?

A. Aside from quite a large number of undertakings in the drainage and sewage of cities, we have been connected with quite a number of important hydraulic investigations, particularly the methods for flood relief as a result of the great floods in Ohio; in 1913 I was engaged for about three years in the outlining and planning of projects for the protection of Columbus, Ohio, and the Scioto Valley; during the same time my partner was a member of the board of consulting engineers in reference to Dayton and we have been consulting engineers to a number of other flood protection projects, including the Kaw River Drainage District at Kansas City, Kansas, and at Council Bluffs, Iowa, and a number of other places where measures for flood protection have been projected or built.

Q. Your firm is very generally known as expert hydraulic engineers all over the country, isn't it?

A. Well, we have been connected with a great many projects under a wide variety of conditions.

Q. You were asked by the railroad defendants in this case to make an examination and report upon the drainage and flood control conditions around the Delmar avenue crossing at St. Louis, as affected by the City's proposed plan for grade separation at that point, were you not?

A. Yes, sir.

I made a study of the grounds and all of my data, practically all of my data, was furnished to me by the Wabash Railroad and through [fol. 335] exhibits that have been introduced in this case following my examination of the ground.

Q. Did those exhibits include the data that the city engineers have through their witnesses presented here in support of their plan?

A. I so understand it.

Q. Will you in your own way state the situation as you observed it around that crossing and then whatever conclusions you have drawn from your investigation?

A. I believe it has been explained in the testimony here that the River Des Peres and the Wabash Railroad approach Delmar avenue from the north; that immediately after crossing Delmar the Wabash turns towards the southeast and the River Des Peres continues on southward for half a mile or more into Forest Park, where it turns

towards the east, the Wabash Railroad in a general way being the hypotenuse of the triangle of which the other two sides are formed by the River Des Peres; during the flood of 1915, the elevations near Delmar were such in reference to the height of the flood that a large part of the flood turned towards the southeast and utilized the right of way of the Wabash Railroad cut as a channel, and a large part of the water passing to the southeastward through the Wabash cut and a part going southward through the River Des Peres channel. This grade separation problem as it is to be carried out, according to the plans as I understand it, contemplates ultimately that the flood shall be confined to the River Des Peres channel proper and cut out from the Wabash cut. Therefore, it becomes important to determine the adequacy of the original channel of the River Des Peres with reference to carrying the large floods that have occurred in the past or may occur again. I prepared a written report on this [fol. 336] matter and reached certain conclusions with respect to the reasonableness or adequacy or proper character of the City's plans for this control.

Q. State in your own way what your conclusions are, and you may refer to your report for any supporting data which you have, and we will say to the City that we will file that report as an exhibit.

A. In determining as to the adequacy of the plans that have been prepared by the City for protecting the Wabash cut against floods, it becomes important to determine the total amount of water that flowed in the 1915 flood at the peak of the flood, the amount that passed down the Wabash tracks and the amount that passed out through the River Des Peres channel. This is important, because during the 1915 flood, the River Des Peres channel was very much overcrowded with water, even though it was not taking the entire flood; this is evidenced by the considerable loss of head at the several bridges along the River Des Peres below Delmar, the head loss at the various bridges ranging from a foot or thereabouts up to I believe as much as three feet, as indicated by photographs submitted by Mr. Johnson, and over two feet as shown by exhibits of the City at some of the bridges.

The evidence which has been submitted in reference to flood heights and slopes in this case indicate to me that the flow down the Wabash cut was not less than 3,000 cubic feet per second; the best evidence as to the total flow at the apex of this flood is furnished by the City in its estimate in which it is estimated that the total flow at about Delmar avenue or city limits was approximately 7,300 second feet, which would leave a flow of about 4,300 second feet, [fol. 337] which probably passed down through the river between Delmar and Forest Park.

The best evidence as to what will happen when 7,300 second feet are forced down that channel is gained from an examination of the conditions that existed in that channel below Delmar avenue, in the City's profiles and the photographs which I have previously referred to, and in the light of the evidence shown on the City's

exhibits and the information furnished me by the railroad, it is my conclusion that if the grade separation project were entirely carried out and a flood similar to that of 1915 should occur again and should be entirely excluded from the Wabash cut, the water would rise at Delmar up about elevation 86.8.

Q. How many feet would that be above present tracks; can you tell?

A. I can't tell you how much above present tracks, but it would be about 2.8 above top of the retaining wall that is proposed in these plans to protect the Wabash tracks, and that is assuming that the plan for a sewer under Delmar is carried out down to a proper connection with Kingsbury Bridge.

The plans I examined showed perhaps the upper 500 feet of that sewer crossing under Delmar boulevard to be a part of the plan, the remainder of that drain was marked as to be constructed by the City. Assuming the construction of that entire drain from above Delmar avenue down to a connection with Kingsbury Bridge, it is my opinion that the water would rise up to about elevation 86.77, if the conduit is stopped short on the dividing line between the part marked as a part of the grade separation plan and the part [fol. 338] which is marked to be constructed by the City, viz., the upstream 500 feet or so of the drain is constructed only, leaving a gap between the lower end of that drain and the Kingsbury Bridge, then, in my opinion, the water would rise up to about elevation 90.83, City datum, or about 6.8 feet above the wall which is shown on plans to protect the Wabash tracks.

In other words it is my opinion that the plan for accommodating the drainage would not be effective in protecting the cut against a flood similar to that of 1915, and it is quite possible that greater floods will occur at some time in the future. It is possible that a flood that has occurred, will reoccur.

Q. Mr. Burdick, contemplating the extensive character of this proposed city improvement and the very great cost that it will necessarily make, would you say the plan as proposed by the City to protect the property from flood out there is reasonably adequate?

A. I would think it is not reasonably adequate; it is my view in a project involving so large an expenditure provision should be made to take care of the greatest flood that is likely to occur and it should be a factor of safety in addition to that.

Q. That is rather an unusual condition out there so far as flood control, considering the drainage area and the character of this so-called River Des Peres?

A. Yes, sir; it is unusual in that it appears to be a very high run off from that area.

Q. For that reason doesn't it become imperative that there shall be a margin of safety in any plan that it is proposed here to take care of that water?

A. I think there should be a proper margin of safety. There are portions out in that territory that are improved and portions unimproved.

[fol. 339] Q. I suppose it will be conceded here that the growth of the City of St. Louis is westward, that there is a marked growth and development along Delmar boulevard and to the west of the Wabash tracks. Assuming the improvement of that territory to the west and northwest of Delmar crossing, what effect will it have upon this flood condition as to reducing the flood danger or increasing it?

A. The more extensive municipal improvements are on that drainage area, the greater is the flood hazard, the greater the floods are likely to be.

Q. Where you get a condition where the run-off, as you call it, comes about so quickly, whenever you get a flooded condition, isn't it more destructive than the ordinary overflow?

A. I think the destruction is entirely a matter of quantity of water flowing and the slopes down which it flows; the improvement of a district tends to concentrate the water more rapidly than is the case without the improvements. Where it is concentrated more rapidly, the danger is likely to be greater.

Q. You understand the plan of the City as to the construction of the viaduct over Delmar. That is, the approaches are to be made of solid earthen embankment except at the points where the Wabash tracks pass under it?

A. Yes, I so understand.

Q. An opening of 56 or 60 feet, something like that?

A. Yes.

Q. If that viaduct along is constructed and the Wabash tracks are not elevated north of Delmar, and there is a recurrence of the flood conditions of 1915, what in your judgment would be the effect on the Wabash right of way and other property in that vicinity?

[fol. 340] A. The conditions would be very much the same as they were in 1915; a large part of the flood would go out by way of the Wabash tracks; it would be divided between the Wabash right of way and the River des Peres as it was in 1915.

Q. The waters in 1915 extended east well up towards Hamilton avenue, did they not?

A. I am not very familiar with the names of the streets; I don't know how far east it did go.

The waters as they crossed Delmar in 1915, as I gain from the photographs, were spread out to quite a considerable width; I don't know just how wide, and after the construction of the viaduct, it would be confined, of course, to the right of way of the Wabash tracks and the sewer that is to be built crossing under Delmar boulevard.

Q. When you confine it to those channels, does not the force of the water and its destructiveness as it passes through there increase?

A. I think it is possible it would be somewhat more destructive right there at Delmar boulevard.

Q. Would that overflow damage be confined to the Wabash right of way, you take the flood area and assuming the condition that Mr. Johnson has shown on the Exhibits 2 and 3 vast areas would be flooded there, would there not, other than the Wabash property?

A. Yes, very much more than is shown on the diagram because that shows the area within the contour line of about 82.5 if I remember correctly, whereas I estimate that the water would rise to elevation 86.8. That would be about 4 feet higher than is estimated on that drawing there, that is, providing the sewer is extended down to a connection with the Kingsbury bridge, and still higher if that [fol. 341] connection was not made, so it would make a very bad flood condition up above Delmar avenue.

Q. Mr. Johnson's Exhibit 2 shows a flood area of 208 acres out there, and it is your judgment then that that is the very minimum, and your judgment is it will be much greater than that?

A. Yes, sir. The area will be increased by the additional area overflowed by a depth of water 4 feet in excess of what is shown here.

In my examination of the city's plans I went into the question of taking care of the drainage in the cut south of Delmar; the plan provides for a 42-inch sewer to drain the bottom of that cut.

Q. That is the sewer that begins at De Baliviere and extends south clear across Forest Park and Palm avenue?

A. Yes, a sewer about 10,000 feet long, about 2 miles, that sewer is based, in my judgment, upon what would be a proper basis for draining a similar area in the City of St. Louis, the area assuming that the street water is kept out of the cut, which I presume would be carried out in the design, is about 24 acres from the inside boundaries of the cut, from the edge of the cut, including the track and the side banks. At ordinary times there would be probably sufficient drainage, although I presume there might be exceptional storms when the tracks would be submerged for a short time.

Q. Is there any margin of safety in your judgment?

A. No, it is not so much a question of safety in regard to just the ordinary drainage of the cut.

Q. It is soft roadbed, isn't it?

A. Yes, it has that tendency, but the sewer at certain times would be blocked up due to high water in the River des Peres; at that [fol. 342] time the capacity of the sewer would be considerably less than necessary to carry out a large storm.

Q. Can you tell us how high the River des Peres would have to be to block that sewer?

A. I think it is shown on the plans; I don't recall the figures; it has to be very high in order to interfere with its capacity very much.

Q. Would it have been as high as the 1915 flood?

A. It would begin to interfere before it reached that height, but I can't tell you exactly the elevation. That sewer is contemplated to carry the drainage in the cut, the rain that falls in the cut. When I computed the area that sewer was designed to drain, that included simply the Wabash; that is all that was shown on the plan that was given to me. So far as I know the plans given to me had no provision for the Rock Island cut; I didn't know it was to be connected to the cut.

Q. If there are large areas in the Rock Island cut that has to be taken care of by that sewer, would you say it was reasonably adequate to take care of that?

A. No, I don't believe it is reasonably adequate to take care of any more than is represented by the area of the Wabash cut alone. Even as to the Wabash cut, there should be a more reasonable provision for the drainage of surface water, in my opinion. I did not examine the capacity of those lateral sewers.

Q. Did you make any examination with respect to the conditions on the Rock Island?

A. I saw how the road is situated there; I made no computations. Mr. Richardson I believe called my attention to the fact that the [fol. 343] Rock Island tracks would have to be depressed where they crossed the River des Peres in order to get down into the Wabash cut; that was only mentioned to me within the last few days, which was the first I had known of it.

Anything in the way of constructing a new bridge at a lower elevation would have an effect upon the problem of the flow of waters in the river because if 7300 second feet is turned into that cut, into that River des Peres channel and excluded from the Wabash cut, it will rise almost to the bottom of those bridges now spanning the channel where the Rock Island and the interurban road crosses alongside of the Rock Island.

Cross-examination by Mr. Burns:

Q. As I understand, the City's plan contemplates reducing, lowering the Rock Island bridge something like 7 feet. What effect in your judgment would that have on the flow of water through the bridge there of the River des Peres in time of floods such as they had in 1915?

A. That would tend to back up still more unless the bridge should be correspondingly widened.

Q. In your judgment that would be bad practice to lower the tracks over the Des Peres River as shown by their plans?

A. I wouldn't say it is a bad practice; it might be the only thing that could be done.

Q. It tends to reduce the flowage area under that bridge?

A. Unless it is compensated by material additions in width. If they contemplated running a sewer down to connect with the sewer along the Rock Island, that would necessitate enlarging the outlet.

Q. In your judgment, the present outlet is entirely inadequate [fol. 344] if any additional water is thrown in?

A. If thrown in in a large amount, yes.

Q. As I understood you, there is already no margin of safety on the Wabash proposition?

A. Yes, sir. This would make it much worse.

Q. If the sewer they speak of running down the cut of the Rock Island should run under the River des Peres by siphon under the river, in order to flow down the cut, would that be a bad practice?

A. I wouldn't call it bad practice; it is something we do when it is necessary.

Cross-examination postponed.

FRED D. RICHARDS, being duly sworn, testified as follows:

Direct examination by Mr. Hall:

I reside at Cleveland, Ohio. My profession is engineering and architecture at the present time; civil engineering is my profession. I had charge of Cleveland's grade eliminations since 1904 to 1920, that is 16 years. The active work commenced as I recollect in 1904 and has been continuous every year since that time, we spent as I recollect, about \$15,000,000. I had charge of the department for the city that was called Department of Bridges and Grade Crossings, that is a subdivision of the Board of Public Service.

Q. And the question of grade separation policy and accomplishment was under your direct supervision?

A. I couldn't say the "policy" was; the looking after the work was under my direction.

Q. During this period what has been done in Cleveland towards [fol. 345] carrying out a comprehensive policy of grade separation? I don't mean in detail, has real progress been made there and is the grade separation work in Cleveland considered as being as progressive at least as in any other city in the country?

A. Except for an isolated crossing here and there and one group that we call Group 3, and I think Group 1 on the Pennsylvania, it is pretty well cleaned up, and a strip on the Nickel Plate. We have reached a point of substantially accomplishing a great work of grade separation in Cleveland.

Q. Generally speaking, how has the grade separation been accomplished, but the elevation of railroad tracks or by depression of tracks under the streets?

A. We have both where the railroads go over and where they go under the streets; take the Nickel Plate, the Cuyahoga Valley divides that into what we call the eastern and western section; the westerly section which is now in progress is all cut; the farthest easterly, part cut and part overhead. Take the Nickel Plate west of the Cuyahoga River, depression had to be done from an engineering point of view; it could have been elevated, but I suppose at very objectionable grades; we were limited on each hand by highway bridges that went over the tracks, now limiting them to highway bridges which are over, perhaps 80% of the railroads went over the streets; the Pennsylvania is right through the center of the city; I can only select about 3 out of 15 crossings that the highway go over the tracks.

Q. Would it be a fair statement to say that where the railroad tracks have been carried under the streets, it was due to a condition with respect to the railroad grade?

A. I would say that in every instance that that would be the case. [fol. 346] The question of unsightliness of the elevated structure of the railroad bridges over the streets was not deemed in any way controlling in determining the city's policy; it is usually where we came down to it the highway came down a steep grade to the tracks, we would simply carry that over and then go down. It was a question of railroad grades primarily.

Q. In Cleveland are the grades separated in the residential districts by elevation of railroad tracks?

A. We didn't look at it from that point of view; they are elevated, we didn't look at it as a residential section except the Nickel Plate on the easterly end it was desired to carry the tracks over Euclid avenue, which is our main east and west thoroughfare, that is, in the residential section and the bridges that are over the main thoroughfare up in the high-class residential tracts, the streets are all under the railroad.

Q. When you took that project up through this territory you are speaking of, what was the original attitude of the residents there towards depression or elevation?

A. I can't say there was any concerted opinion; individuals would come in and those in that section wanted the tracks depressed in the east end, but not as a body coming and demanding it.

Q. Do those elevated railroad tracks approach or cross any of the important thoroughfares of the city or the city parkways?

A. The Nickel Plate crosses, I think, East boulevard; that is one of the streets that goes through the parkway up to Cedar Heights where there are nice homes; beyond that is Cedar Hill, that goes up there; on the west side of the river the New York Central goes over Lake avenue, which is almost the entrance of Edgewater Park, and [fol. 347] continues on there on quite a high bank through a nice residential section. That Edgewater Park is a very important park.

Q. This railroad you speak of goes right along the park, doesn't it?

A. It is about the southerly boundary all the way; no, it crosses at the east end and divides it in half at the easterly end where the dancing pavilion and bath house is, it is the southeasterly end of the park. The railroad is quite high there in places, 25 or 30 feet. There have been no serious complaints from the residents that reached me.

Q. Is that true of the city generally where the separation has been accomplished by the elevation of tracks over the streets?

A. After they have been finished I didn't get any complaints. I did not get any complaints, objections to whether it was to be raised or lowered after the thing was finished; it is usually before that; at the east end they wanted the tracks depressed, at the west end of the Nickel Plate they wanted them raised, before the improvement was in effect.

Q. Where they were depressed, the citizens wanted them raised, and where they wanted to elevate, the citizens wanted them depressed?

A. On the east end they are partially depressed and partially raised; of course it is an engineering problem. You can't get them

up and down, you have to form a logical profile and the highway is made to suit that. Usually you might hear of formal complaints, it would be introduced in the council, then come to the director of public service and from him to the chief engineer, then it was my department to report back.

Q. From your study of this problem of grade separations in cities [fol. 348] during all the years and in view of the results accomplished in the City of Cleveland, what is your judgment about the plans, which is the preferable plan, elevating tracks over streets or depressing them into a cut under the streets?

A. I have been educated quite a little; when we first started I wanted the highway over the tracks, the idea being you want the people up in the air, but the more you do the more you think you want the tracks up there, the streets under the tracks. The more work progresses, the more I am confirmed in my belief that the elevation is preferable. At Euclid we had one crossing on the Pennsylvania where it crosses Euclid and East Fifty-fifth street, the track forms a hypotenuse of a triangle; we almost insisted that they go up there, and without very much depression in that main thoroughfare, and I think it would have been a calamity if they had put it down unless they put it in a tunnel.

Q. You think the depression is only justifiable where the topography is such as to make it necessary for the railroad to be put in a cut in order to secure a proper grade for operation?

A. You make a real engineering job, an improvement for both highway and the job; yes, I do.

My official connection with the city ceased Jan. 1, 1920. I have not noticed anything in the papers about any further grade crossing work except the work which the Nickel Plate has now in progress and I left that and the plans were all prepared for that.

Q. In your study of this problem of separating grades by depression v. separation by elevation, did you have occasion to consider the effect of the operation of trains in cuts as compared with operation on elevated embankments?

[fol. 349] A. No. I might explain how damages first originate; when we start an improvement or adopt a plan, property owners are notified and they then filed claims for damages within a certain date, I think 15 days; sometimes when the improvement is finished, we go out and make an estimate of those damages, get the people together and say "This is what we estimate; this is what you claim, we will settle for so much." We would go into the houses and yards, perhaps as an excuse for their high damage claim in numerous instances, not exactly numerous, but in some instances the women have called our attention to the fact on the Nickel Plate about the clothing drying would get all covered with soot and they have to keep their windows closed to keep it from coming into the houses.

The deepest cut of the Nickel Plate I expect the smoke-stack is about level with the adjacent ground; it can't have a chance to rise very high before it strikes the houses.

Q. Is it your judgment that the smoke nuisance is increased where the track is in a cut?

A. Oh, yes, I think so. We spent a lot of money trying to ornament these bridges; in a short time they looked uglier than if we hadn't tried on account of the smoke. The Nickel Plate wasted a lot of money.

Q. That is where the street is carried over the railroad?

A. Yes, highway bridges. I don't know that I have particularly noticed vibration of the train in the cut as against one on an elevated embankment.

Q. Is the cinder nuisance aggravated the same as the smoke nuisance by operations in a cut?

A. That wasn't called to my attention, although that might have been included in their general objection to the soot.

[fol. 350] Q. Is it true, isn't it, that your experience has been that there have been very serious objections made to smoke and cinder nuisance from operation of trains in cuts where the tracks have been depressed?

A. In the way I have just spoken of; sometimes before the plans were adopted somebody would come in and imagine how conditions were going to be, which would not always materialize.

Q. What has been your experience in Cleveland about the cuts, where tracks have been depressed, being used for dumping grounds for refuse and things of that kind? Had any trouble with that?

A. I don't recollect anything like that. I think the Nickel Plate is experiencing some difficulty in holding their embankments; the cuts originally were just side slopes and I noticed recently they are building low retaining walls, so they may be experiencing difficulty with the slipping. I think we started that cut of the Nickel Plate about three years ago; it won't be finished this year; it must have been more than three years ago. We were held up quite a little by the war, couldn't get help. The men in the Nickel Plate are working there all the time and I presume if it were used as a dumping ground, they would stop it.

I have been out and looked over the ground in this Delmar grade separation matter.

Q. From your standpoint and your knowledge of the situation there, which plan of grade separation is the proper plan?

A. I think I would go up there; I don't think there is hardly any question what is the best plan.

Mr. Burns:

Q. What reason do you give for your last answer as to your [fol. 351] judgment being that the grade separation should be accomplished by having the railroad over the street rather than the street over the railroad at Delmar?

A. I would like to have the engines up there to get the smoke up there; I would put them on top of the buildings. I think raising all the way through would be better.

Q. Your judgment would be it would be better to have the track elevated through Forest Park rather than depressed, wouldn't it?

A. Yes, I would. You see I don't know how the atmosphere is in Missouri, but in Cleveland we get a great deal of heavy weather where the smoke hangs right down to the ground. You take Edgewater Park, the people are enjoying it now, they go there with their families; you can't get alongside the tracks; you have to get some distance off and for your park, it would limit the use of it.

Mr. Brown:

Q. There is one thing I overlooked. Where the separation has been accomplished by elevation, has there been any retarding of improvement up to the railroad in Cleveland?

A. You mean of industries? No, I can't think of none now. No evidence of damage to property by reason of track elevation has ever come to me. I didn't bring any photographs.

Cross-examination by Mr. Senti:

Q. Mr. Richards, I will ask you if you recognize that as one of the bridges that has been erected over the roadways in Cleveland?

(Witness examines photograph.)

A. Yes, I see now, it is Lake avenue, right there at the entrance to Edgewater Park. That was constructed about 5 or 6 years ago; it might have been four.

[fol. 352] Q. It is about the character of the bridges they have generally constructed, is it not?

A. Oh, no, this one we put about \$15,000 worth of ornamentation on. I didn't go much on that fancy stuff; that was designed by an architect; on the Nickel Plate on the east end they tried all this ornamentation and then tried concrete and whether it is a fancy bridge or not is a matter of taste; the Pennsylvania crossing Euclid avenue, was designed by Burnham of Chicago; he put some cast iron on that, somewhat of the same character of structure.

(Said photograph is marked "City's Exhibit 103.")

Q. That presents as attractive an appearance as any of the bridges that have been erected over the streets in Cleveland, does it not?

A. To my judgment it looks pretty nice.

Mr. Brown:

Q. Attractiveness is a matter of taste, isn't it?

A. Yes, the engineers don't believe in that; they think it a waste of money.

Mr. Senti:

Q. But even from your viewpoint it is as attractive as any of the bridges that have been erected in Cleveland over the streets?

A. Yes, if you like that stuff on there. I think it ought to look like a bridge and not like a cornice on a building.

Q. Do you recognize that one (indicating)?

A. I recognize this, it is a bridge carrying the New York Central over Detroit street. This is the first one accomplished in Cleveland that I had anything to do with. The New York Central, then the Lake Shore erected that bridge. Detroit street is rapidly becoming a retail business district in with residences; you are getting out towards Lakewood, which is purely residences.

[fol. 353] Q. In that particular section of the city where that structure was erected, would you characterize that generally as a business district or a residential district?

A. When you talk of a district, you talk of an area. That (indicating) is the gun works there, beyond that there used to be a few saloons and a few grocery stores and a bank; I don't think those have increased at this time.

Towards you here is the Winton Manufacturing which is perhaps half a mile beyond there (indicating).

Q. That is a bridge of the average character that has been erected over the highways of Cleveland, is it not?

A. Oh, no. That (indicating) is a plain common ordinary bridge with particularly poor looking abutments; this is just a bridge; that is the first one we built; we did not know we could soak the railroads for a lot of ornamentation in those days.

Mr. Brown:

Q. The City of St. Louis is trying to go you one better.

(Said photograph is identified and marked "City's Exhibit 101.")

A. I recognize the one marked "3" in the corner. That is Madison avenue, carrying the New York Central. That was erected 5 or 6 years ago. We had so many of these things I can't recall the dates; that was done about or immediately after the Lake avenue bridge, the first one you showed me. I don't believe I could call that typical; there is no attempt at ornamentation on that bridge; that is right around where there is a manufacturing district, the Winton Automobile is on one side and the varnish works on the other; we don't even panel the abutments there.

(Said photograph is marked "City's Exhibit 105.")

[fol. 354] Q. The photograph marked "No. 7" in the lower right-hand margin, do you recognize that as one of the overhead bridges of Cleveland?

A. That is one you have got on me.

Q. I will refresh your memory and ask if you recognize that as the Erie elevated over East Fifty-fifth street?

A. Sure, the highway is raised on this side (indicating). That was erected in 1906 or 1907 as I recollect. That is not typical, that is one of our original attempts, where these crossings weren't in what

we called a nice business or residence section. We didn't try much ornamentation. Over to the north there was some manufacturing and over to the south and southwest is rather a poor residential section, what we call the foreign element.

(Said photograph marked "City's Exhibit 106.")

I presume subconsciously we took into consideration the surrounding inhabitants when we constructed a bridge, take where we tried some ornamentation, considerable ornamentation was that Lake avenue bridge, the Edgewater Park, the Pennsylvania did that because that crosses almost all the important streets going out our nice section, what we call the East End; then the Nickel Plate east of the river, east of Quincy street, going across East boulevard, Cedar avenue, there and Euclid avenue, attempted very elaborate ornamentation in concrete.

In my direct testimony I said eliminating the Nickel Plate on the west side which is all highway bridges, where we had to go down, where there might be a choice whether we go up or down, I am guessing at the 80%. I could name the crossings I think if you wanted them.

[fol. 355] Q. You couldn't say anything about the number of bridges that you elevated under those conditions and the number you actually depressed? About how many bridges have you in mind in determining the percentage?

A. Take the Nickel Plate on the east side, we have eliminated the west side, we go over east until we get to 105th street and Quincy; we had to carry those over on account of the Cleveland Short Line coming across Quincy right there; right to the east of the intersection of East 105th street and Quincy; that is where the street is carried over the railroad, at the intersection of Quincy and 105th street; the Nickel Plate comes across and forms a hypotenuse there may be 100 or 200 feet from this intersection, 105th street, was so we had to warp the bridge for 150 feet, and we had to go down under that and the Nickel Plate was depressed some, but not much, perhaps not more than 2 or 3 feet; there is two—

Q. (Interrupting) Those are cases where the character of constructing had been fixed by existing conditions and could not be altered?

A. Due to these tracks coming in there, yes.

Q. When you determined to choose either elevation or depression, you were governed by conditions that had already been established?

A. The original conditions there, except this short line going across, that went across before this was built.

Q. That was the conditions, it prevented your adopting the other method?

A. Yes, unless you went to excessive cost.

Q. Just like the case we have here, when we established the method by which the grades shall be separated at Delmar, we fixed and [fol. 356] determined the methods to which they will be fixed in the south?

A. Surely. The same conditions prevailed there because that is one group, the whole length of that. We had numbers to designate that group; I don't know whether that is group 1; then we had another group No. 3.

Q. How did you determine into what group you would put them?

A. Nothing at all, they just happened to come so far on the railroad. You wanted the number of crossings, we started off with two highway bridges, then we took another highway bridge that was a highway bridge before, two railroad bridges, two more highway bridges, another railroad bridge, Euclid avenue, is all on the line until you get to the east end when they are all elevated, the tracks are elevated.

Take on the Pennsylvania, we had the last group, Group 2 we called it, there was nine crossings in there and all elevated; the next Group 3 which hasn't been started, there is about five and all elevated; Group 5 there is two in that, one will be elevated highway and a depressed highway in that one, Group 5; at the southerly end of the city there are two highways and three railroad bridges.

Q. Then you wouldn't say 80% of the entire crossings, when the grades have been separated, that it has been done by the elevation of the tracks, would you in the entire city?

A. I guessed at it; I can figure it. I have in mind about 80%.

Q. When they first began the practice of separating the grade crossings what method was most generally adopted, elevation or depression of the railroad tracks?

A. We had isolated crossings; our first crossing is one of these [fol. 357] photographs, the New York Central, we depressed the highway; the next crossing was the Nickel Plate, perhaps 1,500 feet easterly from that and the street dipped down to the track, and we went over, and then the next group was Pennsylvania Group 5, which I have enumerated, which is the most important, which was track elevation.

Q. Then in the early part of the work of separation, the tendency was to adopt the system of separating the grades by the elevation of the tracks?

A. No, I wouldn't say that; I think we studied the situation to find what is the engineering problem, looked at it from an engineering point of view.

Q. As the result actually accomplished, the majority of the grades were separated by the elevation of the tracks, were they not?

A. You can call it fifty-fifty, but in there the street dipped down to the tracks, if it had all been level, I don't know what the policy would have been.

The law in Ohio is that by mutual consent we can make the clearances 16.3, now the legal height is 21 or 22 feet. I don't know whether the railroad company insists on the 21 or 22 feet, but the first bridge was 16.3 and the one they are now on is 16.9; the Pennsylvania is 21 or 21.6 clearance. There is a grade crossing law in Ohio, you know, which says that the clearance over a railroad must be for a new bridge or a reconstructed bridge, and that is 21 feet or 21.6.

Where there is no agreement that is what the law states you have to provide, we will say it is 21 feet or more, where you build a new bridge or reconstruct an old one you have to make it 21 feet; the grade crossing law says you make it 16 feet three where there is no [fol. 358] objection to it, not objection, but where the railroad comes forward voluntarily and says "We will make the clearance 16 feet;" where they want it 21 feet, we don't object.

Q. In your direct examination I believe you stated that the choice of methods, elevation or depression, was not determined by the unsightliness of the structure?

A. No, I don't think that ever entered in; we thought if we wanted an ornamental bridge, we could do it either way. We felt we could make the elevated structures just as attractive as we could the depressions.

Q. And the sections of the city that were traversed by the railroad-tracks after they had been depressed, aside from the points immediately adjacent, you consider these just as attractive when the tracks were elevated as they were when they were depressed?

A. It depends on what you did to them; some of the bridges we decorate with columns, the Lake avenue, under the New York Central and Euclid avenue, we enclosed those in fluted iron columns. For a considerable distance on each side of the actual crossing there would either be a depression or an elevation in the roadway surely, and the railroad company would either travel on elevated tracks or they would be underground or depressed.

Q. Did you give any consideration to the unsightliness of the elevated structure away from the immediate point of intersection?

A. The Pennsylvania is all elevated and that is retaining walls mostly with fill, there was no attempt there to produce any ornamental retaining walls. The appearance of the completed structures did not enter into our determination at all.

[fol. 359] Those complaints of soot came from people who resided adjacent to the right of way usually; there were no direct complaints of cinders themselves. I never made any study of the diffusion of soot from locomotives. I did not see the clothing these women complained of.

I saw the ground at Delmar and the Wabash railroad tracks. I would prefer the elevation of the tracks. I spent all yesterday afternoon on the ground. I have had the plans for some time.

Q. Would you think that after having the plans at your disposal that you could reach a satisfactory conclusion by an inspection of the project of this magnitude which was limited to one afternoon's time?

A. I was not asked the question which was the "proper," but which I would prefer and I answered that I would prefer an elevated structure as a rule.

Q. You could reach a conclusion that was satisfactory to yourself after an inspection of that kind?

A. You mean for the proper construction? Oh, no.

Redirect examination by Mr. Brown:

Q. The first photograph the City showed you of the New York Central bridge crossing to the entrance to Edgewater Park, do you know whether or not they showed it as an example of ugly structure or beautiful. (Indicating) Here is another view of it that may perhaps be enlightening.

A. This shows just a general view, doesn't show anything in detail of the bridge. It shows the view of the bridge from the drive- [fol. 360] way; that is the Edgewater Park, the entrance is there; that is what the traveler on the street would see.

(Said photograph marked "Wabash Exhibit 8.")

Q. The City has shown you a number of pictures of railroad bridges over streets in the manufacturing and foreign residential districts of Cleveland. I would like to call your attention to some bridges in the better residential sections such as we have in St. Louis. Look at that one, please, and tell what it is?

A. That is the bridge over East boulevard, going from the bridge here (indicating) is Cedar Heights where the wealthy people live. This is only an arched bridge, concrete, the others are girder bridges mostly.

(Said photograph marked "Wabash Exhibit 9.")

That is the same bridge only a little nearer view.

Q. Look at this one.

A. That is one out East Cleveland, I couldn't name the street, but it is the general character of the bridges out in the residential district.

(Said photograph marked "Wabash Exhibit 10.")

Q. Here purports to be a picture of the New York Central bridge over the boulevard at Gordon Park, one of the principal parks.

A. That is either right in the park or is at the junction of Gordon Park and Rockefeller Park; we have a string of parks; Wade Park and Rockefeller Park and Gordon Park, that is in there somewhere. I think in Gordon Park; just the south end of Gordon Park.

(Said photograph marked "Wabash Exhibit 11.")

Q. So that (indicating) is an example of the treatment of the [fol. 361] elevated bridges in or at the entrance of one of the principal parks?

A. That is right in this group of parks, it is all one park.

Q. Here (indicating) is a picture of the New York Central bridge over another boulevard, what is that, West boulevard?

A. I believe it is; this runs into Edgewater Park, comes out of it westerly up into Detroit street. I never walked to see how close it is to the park; I drove in the machine; it is about two minutes or a minute's drive.

(Photograph marked "Wabash Exhibit 12.")

Q. There is one under construction apparently at the time it was taken?

A. That is the first arch you showed me; it is over East boulevard.

(Photograph marked "Wabash Exhibit 13.")

This one is another East Cleveland grade crossing. I see the residences shown on each side of the photograph, that is in East Cleveland. That is outside of the City of Cleveland, I never heard any complaints about that.

(Said photograph marked "Wabash Exhibit 14.")

Euclid is probably the principal east and west avenue. That is the Nickel Plate cut near Lakeview Cemetery; Lakeview Cemetery is about 5 feet beyond that. In the immediate vicinity it is a business neighborhood, but beyond here (indicating) is residential.

Q. Has that ever shocked anybody's sensibilities?

A. I have not heard of anything.

Q. Cleveland seems to be a city of handsome bridges. I will show you one more.

A. That is the entrance of Cedar Hill and one side is the boulevard, [fol. 362] the other side is the regular highway. Beyond the picture is Wade Park. The street railway passes under the bridge.

(Said photographs marked "Wabash Exhibits 15 and 16.")

Q. Does this Exhibit 16 and the picture of Euclid avenue, in your judgment, show a satisfactory method of treatment, where the street cars are on the street at the railroad crossing?

A. The architect passed on those things. It is drawn according to the architect's ideas. We have bridges of different characters in Cleveland.

Q. Have you experienced any difficulty where your railroad bridge was over the street in a neighborhood that received some special treatment of having the structure conform to what would be reasonable and proper, considering the surroundings?

A. Making the bridge harmonize with the surroundings? Oh, no; you can do that if you want to spend the money.

Q. You regard this gingerbread work as a waste of money?

A. You bet it is. But for those who like it it can be put on; it is a question of money.

Q. Summarizing your testimony as I have understood, correct me if it is not in line, your policy and the policy of the authorities in Cleveland in regard to the grade separation, is primarily, in regard to grade separation, from a practical standpoint, that as a result of your study, the general policy has been to separate the grades by means of elevating the railroad tracks over the streets, as a general policy, but in exceptional cases where the character of either the ground or the surroundings of the crossings or other conditions is to make elevation impractical from an engineering standpoint, then [fol. 363] there have been isolated cases here and there where the railroad has been carried under the ground?

A. No, I would not say that; there has been no general policy; it has been looked at as an engineering problem and we wanted certain things done; for instance, Euclid avenue, and Fifty-fifth street, we wanted a very little change in the streets; it wasn't wise to go down, so we had the railroads go up, and that in a measure regulated the crossings either side of that.

Q. But judged by the results as you have accomplished them, there in Cleveland, the general result has been a large majority of cases where the crossings have been separated by elevation?

A. I would have to stop and figure up the majority. I roughly guessed 80 per cent excluding the ones on the Nickel Plate on the west side which are all highway crossings.

A. M. CURRIER, being duly sworn, testified as follows:

Direct examination by Mr. Brown:

I reside at Cleveland, Ohio. I am engineer of grade separation for the New York Central Railroad. I am by profession a civil engineer. I graduated from the University of Iowa and have had approximately 21 years' engineering experience all on railroads. I have been in my present position 7 years.

Q. Is that your first connection with grade separation work?

A. Oh, no; I got a little grade separation experience in 1903 and considerable in 1908 and 1909 and on up to the time I took charge of the grade separation in 1914. On all of the territory west of [fol. 364] Buffalo in the design and supervision of the construction and negotiating with public bodies and commissions I have immediate charge on our line of railroad.

Q. Name some of the principal cities that your railroad runs through in which the grade separation work has been either under consideration or construction?

A. Starting at Chicago we have that city, South Bend, Elkhart, Fort Wayne, Indiana; Toledo, Ohio; Detroit; Fort Clinton, Sandusky, Cleveland, Painesville, Ashtabula, Youngstown, Ohio; Erie, Westerville, Harbor Creek, Pennsylvania; Dunkirk, New York.

Q. Have you had occasion during your work to give consideration to this general question of separating grades by depression of tracks under the streets or elevating the tracks over the streets?

A. Yes, I have; that is a question which often arises. There is no question but that the elevation of a railroad is much more desirable, I think, from all standpoints, the standpoint of the municipality as well as that of the railroad.

Q. What is the chief point of desirability from the standpoint of the railroads?

A. The first is the lesser cost in general of an elevation over depression of a railroad; there are a great many operating troubles brought on on account of the presence of water, the blocking of the railroad from snow; in almost every case where there are industries along the railroad, depression absolutely knocks them out.

From the standpoint of the municipality—the railroad is up in the air and there is less bother from smoke; they generally get a clearer view through the bridges and the streets are less disturbed during construction work.

[fol. 365] Q. A railroad that is laid out years ago through a territory that was then vacant, but has been built around the railroad; there is no practical possibility of widening your right of way strip?

A. That is true, and in the case of an elevation, a railroad can get a maximum number of tracks on its existing right of way, in the case of a depression, there is always one or more tracks cut out. That is a very important element in this matter of future development and growth of the railroads in the large cities. It is a practical impossibility of extending beyond your present property limits in large cities, and that makes imperative the necessity of utilizing to the fullest extent possible present right of way.

Q. You say that in cases of depression, you are sure to lose the width of your right of way to the extent of one track. How is that?

A. Because in the case of an elevation, you can build your retaining walls with their face along the right of way lines, utilizing on top of the filled space between the walls all of the right of way; if the right of way is depressed, you either have to take up your own property by slopes or by retaining walls, and the available width is narrowed by the width of walls or slopes. You have to have a proper clearance. In other words, in a 56 or 60 foot right of way you can get four tracks on an elevation and only three in a depression.

Q. At Delmar crossing the right of way is 56 feet in width, the elevated track capacity on the overhead crossing is how many tracks?

A. Four tracks; by the depression method the track capacity is three.

Q. Tell us something about what you have done in the matter of [fol. 366] grade separation on your railroad, whether it has generally been accomplished by the elevation plan or by depression and if one or the other, what it was governed by extraordinary and unusual conditions?

A. On the work of a purely grade separation character, our work has always been done by an elevation; I have never in all of our cities heard of a serious suggestion for depression of the railroad through the city. There is one point which has been touched on at this hearing, and that relates to the Nickel Plate Railroad on the east side of Cleveland. I am familiar with the conditions there. I had something to do with that problem on this account, that the New York Central Railroad constructed a belt line around the City of Cleveland ten years ago and in its construction it parallels for about two miles the Nickel Plate, and the construction of the belt line is what brought up the elimination of grades along the Nickel Plate and they were eliminated or constructed jointly.

Q. Tell us what conditions forced the depression of the Nickel Plate tracks at that point, if that was the case?

A. It was due entirely to the topography of the ground traversed by the railroad; the policy was to work to an elevation the railroads and put the streets underneath, but due to the profile of the

railroad in order, to make the proper grades, it was necessary in a few streets to carry the highway over the railroad; in most cases, or in at least in half of them, the street approached the railroad on a very steep grade and could not be carried on. In connection with the number of cities where you might call the work an elevation, would embrace about nine principal cities, that is Chicago, South Bend, Fort Wayne, Toledo, Detroit, Fort Clinton, Valeria, [fol. 367] Cleveland and Erie. In all those cases the separation has been accomplished by elevation.

Q. Something has been said in this hearing about an order of the Michigan Commission requiring the Grand Trunk to depress some of the tracks in Detroit. Do you know anything about that?

A. To a certain extent; our railroad from the time it was built in Detroit in the late fifties up till 1917 connected with the Grand Trunk about two or three miles from the Detroit station and used that line to reach the heart of the city on a trackage right. This line is located in the city street called Dequindra. The question of grade separation came up and I attended the preliminary hearing and saw the expense that the city was forcing on the railroads and we withdrew from that line within a few weeks after that after a 60 year use and used another route. After I found that the city was trying to impose on the Grand Trunk I did not wish to be a party.

Q. Were there any special conditions as to the little stretch of track in Detroit that this question came up about?

A. Yes, there were; the Grand Trunk from the point where the New York Central joined it descended towards the Detroit River and towards the foot of this grade, the Grand Trunk I think from the time it was constructed crossed under three streets, one of which is the very most important street leading along the river in the City of Detroit, Jefferson avenue. Ever since I came to know it, there has been a bridge over the railroad at that point, and the city did not want to depress that street any and predicated their plan, starting with the depression immediately adjacent to these three streets and carrying it on through the city a mile or so and [fol. 368] then went out to grade and went overhead over the streets. It was elevated from there on.

Q. Has that depression scheme of the city ever been accomplished?

A. The work has not been accomplished and I am not sure about the status of the case before the Commission. I think it has been ordered.

Q. Have you looked over the ground around the Delmar crossing south and north of the crossing, the Wabash tracks in St. Louis?

A. Yes, I have looked it over twice this month and I am otherwise very familiar with it, having been around every year or so.

Q. Assuming that the grades are required to be separated there, which in your judgment is the most practical plan, the elevation or depression of the tracks south of Delmar according to the city's plans, north of Delmar, according to the city's plans, or straight elevation from the north city limits around to the park,

A. Well, I think the elevation of the railroad is much more preferable and under the peculiar circumstances the only thing to do in that locality.

I have observed the presence of the River des Peres out there. I have heard the testimony of Mr. Burdick and Mr. Johnson. I have looked into that question in a general way; made no detailed investigation. In my judgment from a railroad engineering standpoint in view of that condition out there it would be neither safe or practical to attempt to depress the railroad tracks. Generally speaking the depression of tracks is generally the most expensive. The depressed scheme of a railroad destroys the use of the streets much longer than in case of elevation, and in this case there would [fol. 369] apparently be but little interruption to street traffic while the work is going on.

Q. In the construction of a viaduct over Delmar avenue could the traffic be carried on that street during construction?

A. I should judge it would be very impractical and expensive to attempt to handle that traffic in that vicinity at all while the work is going on. Where we elevate over streets, traffic is not unreasonably interfered with in most cases.

Cross-examination by Mr. Rodehaver:

Q. You named nine cities that you read from that paper. What did you say in reference to those cities?

A. I said in each case the general practice of treating grade separation was by elevation of the railroad. I did not mean to say that grade crossings had been eliminated in those nine cities; the question was, I believe, that where it had been accomplished or contemplated in this list, it is either accomplished or has been agreed upon with the municipality. We have not eliminated grade crossings in Indiana, but it is all agreed to be elevated and the streets to be passed under the railroad.

Q. At South Bend wasn't that by reason of the peculiar condition of the soil and its approximate location in that territory that you couldn't depress the tracks?

A. No; the track depression was not even mentioned at South Bend; it could be done; we depressed one of the streets approximately ten feet, and probably could go down further; I don't know.

Mr. Senti:

Q. I believe you stated it was part of your work in connection with the separation of grade crossings to deal with the authorities of the municipalities affected, was it not?

A. Yes, sir.

[fol. 370] Q. Has it been the policy of your company to defer to the wishes of the municipalities through which your railroads passed in the matter of grade separation where you found it practicable to do so?

A. Yes, we certainly try to please the municipalities; they are our best customers and we want to please them if we can reasonably.

Mr. Brown:

Q. Does that mean you do everything they ask you to do?

A. Absolutely not; I say it must be reasonable.

Mr. Senti:

Q. On the other hand, it does not mean to say you refuse to do anything they ask you?

A. Certainly not.

Q. In your direct examination you stated some reasons why elevation of tracks was more desirable. I wish you would give me those various reasons again.

A. I think I could get a few more; I have some listed here.

Q. I prefer you to give them, first those that make elevation desirable and depression undesirable if you could, as near as you can.

A. I gave them off-hand; the first I gave was the increased cost of depressing the railroad; unless a railroad is depressed twenty-five feet or more a hump is introduced in all the city streets obstructing the view, driving along the streets a railroad depressing is unsightly; no matter how good the residence district is it becomes a dumping ground for tin cans, old boilers, bed springs, anything you like; you can see it out Delmar avenue in the existing little cut that is there. The earth slopes are subject to erosion and washing. I have seen many cases where, no matter how well the top of the cuts are fenced through cities, it is dangerous for small children to [fol. 371] be around the tops of these cuts. Street bridges crossing over a railroad are, if protected by concrete broken and become unsightly; if not protected, they are quickly eaten out by the blast of the engines; the smoke coming out of an engine in a railroad cut blows across the bridges, obstructing the view and I think causes more dissatisfaction to surrounding inhabitants than if it were further up in the air.

I have already touched on the fact there is more interference with street traffic during the construction work, and generally I think the construction of a railroad depression would cover a much larger period than the elevation. If industries are adjacent it is practically impossible to serve them from a depressed railroad; generally a longer grade is required to get out of a cut on account of a depression, and it requires the engines to work very hard and emit additional volumes of smoke; in almost any cut the railroads are subject to blockade from snow, water and ice and in this particular case the tracks are below ground water, which is an exceedingly serious matter; then, also, the objection stated that in the depression you are cut out of the use of one track on your right of way. I think all of these specific objections are applicable to the Delmar grade crossing. I spoke of the clearer view being obstructed, I mean the people using the street is more obstructed when the tracks are depressed, unless they are depressed a great distance—twenty-five feet or more.

The Wabash at Delmar has two tracks there at present, but the future may bring more. The plan submitted by the City contemplates their having two at least.

[fol. 372] Q. Have you any information as to the sewer that the City proposes to give the River des Peres, which has been referred to as the River des Peres Sewer Project?

A. I have a general knowledge of it, such as I heard here and before the hearing. I did not attend the previous hearings. I did not make any statement as to the hydraulic conditions at Delmar.

Q. You spoke of the necessity of combating the overflow, did you?

A. The question to me was that if the conditions existed as testified to by previous witnesses, what would be the effect on the railroad, and I testified, it would be very disastrous; but I made no personal study of conditions there with reference to drainage, and the answer was based altogether on the hypothesis that the testimony I had previously heard was correct.

Q. And no consideration was given to the testimony which has been submitted on the same subject on behalf of the City?

A. No. I simply assumed that the water would overflow on the tracks. I have been over the improvement twice from Olive Street road to Kinsbury highway, but in addition to that I have lived in this City and work here and have many relatives living within a stone's throw of this railroad, all through the length under consideration. When I say "this City," I mean St. Louis.

Mr. Senti:

Q. When you speak of the plan of separating by elevation being the most favorable, do you mean it is more favorable to the railroads or to the property owners, or to the municipality, or to whom?

A. I think it is most favorable to all parties. I assume that the municipalities in the first place are interested in a total cost of the [fol. 373] project, therefore, I assume they are interested in the cost which may come out of their own pockets.

At this point an adjournment was taken until 10 a. m., November 15, 1921.

The hearing was resumed November 15, 1921, as follows:

A. M. CURRIER, recalled.

Mr. Brown:

Q. In response to one of Mr. Senti's questions you stated that among the objections to the depression scheme of grade separation was the effect of smoke from the locomotive being emitted below the surface of the adjacent land and property. Describe what the damaging effects of that sort of operation are.

A. I have already mentioned the extreme corrosive effect on the bridges, if not protected by steel floor beams, and the underside of the girders are quickly eaten out and weakened; if they were renewed by concrete protection that concrete rapidly deteriorates. Also the bridges with concrete protection are badly blackened up and do not look at all well after a very short time. Furthermore, where the street goes over the railroad, with a train coming through the cut, emitting smoke, very often this smoke comes in dense clouds and is blown across the surface of the bridge. It also chokes up the drivers and pedestrians along the street and is a serious menace to street traffic.

Q. Does that condition actually occur with frequency? Have you [fol. 374] observed these conditions and on viaducts?

A. Often; I think it is a serious menace and dangerous. I have touched on the effect of the smoke swirling along the ground when it is emitted from the stack just a few feet below the ground level in a depression and it does not get a chance to diffuse itself into the air.

Q. Under the City plan for a considerable distance the roadbed is about twenty-two feet below the surface of the ground. That would put the top of the smokestack about six feet below the surface of the ground, wouldn't it?

A. Yes, sir; approximately that. In very heavy atmospherical weather that smoke would be very apt to spread over the surface of the ground in large volumes. The smoke in heavy weather tends to keep down and it is some considerable time before it diffuses itself in the air; it is very apt to settle into the cut and that, of course, is a very serious menace to train operation, particularly in regard to seeing signals, and I think it would apply in this St. Louis case where you have an interlocking plant with the Rock Island down in the cut.

I think where the Rock Island connects with the Wabash tracks at De Baliviere avenue is about as deep as any part of the cut. There is an interlocking plant there to protect the railroad connection; the signals of an interlocking plant are known as semaphore signals; about 20 or 22 feet in height.

Q. That would throw the semaphore signals of this interlocking plant near the surface of the ground. What would you say as to the danger in times when this smoke settles around, a heavy atmospheric condition obscuring the signals and rendering the operation dangerous under those conditions?

A. I think it is a serious danger and certainly a great obstacle to [fol. 375] operation. The same condition could be true as to any system of block signals that may be set up in this cut—any switch signals or anything that pertains to the operation, or any hand signals that may be given. This smoke may be thrown out onto adjacent property; it is pretty heavily charged with coal gases and carbon. I think it would have the effect of damaging vegetation on adjacent property principally because there is necessarily some amount of cinders in the smoke. I think it is liable to blacken the

vegetation a little. I don't think that is as serious as some other points.

Q. When Mr. Richards was on the stand the City introduced through him some photographs of some bridges in Cleveland, I think over your railroad. My understanding of the City's purpose was to show that that was an unsightly structure. Have you any comment to make on that?

A. Yes, and on one or two other photographs the City put through. This Detroit Avenue Bridge, a photograph of which the City presented, was about the first strictly grade separation project that was undertaken in the City of Cleveland. It was also about the first concrete masonry that our railroad had used. We were in a country where stone was easily obtainable and we stopped stone masonry long after many railroads had gone to concrete; the result was that through this whole subway that some little lack of experience on both the part of the railroad and the city engineers, the design is not at all good and the execution was considerably worse. The bridge and general appearance was not good. The subway as a subway for use by both the railroad and the city is first class in every particular. [fol. 376] There was another exhibit the city put in, the East Fifty-fifth Street Bridge under the Erie Railroad; same comment would apply to that bridge and subway as apply to the Detroit avenue subway. The City put in a picture of Lake Avenue Bridge which was badly taken; it does not show the situation. Lake avenue is a very important street right at the entrance of Edgewater Park, a very beautiful park on the lake front. A point where the principal bathing beach is located; also dance pavilion and other facilities for outdoor recreation; this bridge is a very beautiful structure of good design and extremely convenient subway for the public and stands the railroad in good shape.

Another picture presented by the City was of Madison avenue and Cleveland. This is a very important thoroughfare in a purely manufacturing district. It leads to many manufacturing districts and to some residential districts. The street originally crossed the railroad at a very sharp angle about 15 degrees, and our railroad was on such a grade it could not be elevated an inch and the street was depressed the full depth required, which was approximately 20 feet. The City had the policy of not desiring columns in the center of the street, which policy changed since. On account of not allowing the center columns which would have cut down the expense, it was necessary to twist the crossing with relation to the existing street. Every photograph taken gives an appearance as if the view was somewhat obstructed to street traffic. It does not show the true condition. As a matter of fact the subway is entirely convenient to the public, first class in every way and not dangerous.

The policy of the railroad has been a sensible one. We have as a rule deferred as far as possible to the wishes of the municipality. [fol. 377] In a district where there are factories adjoining the street and the city has no suggestion of any particular ornamentation, as well-designed steel bridge is certainly not an eyesore and fits in with the factories and general character of improvements surrounding the bridge.

In case of boulevards and highways over which a large number of people travel the city generally desires some ornamentation and in most cases it is put in. The bridges are made pleasing in character and in residential districts where residences are right up to the railroad special efforts are made to make the bridge beautiful.

I think we have succeeded in satisfying the municipality and residents in regard to design of bridges. I hear of no complaints. I don't think there has been any retarding of development there at all. The best illustration of that is in East Cleveland along the Nickel Plate Railroad and our Cleveland Short Line, which is the Belt Line previously referred to. In that case there are first-class houses right down to the railroad right of way on dozens of streets and the character of those houses is as good as ever, with their former good class of residents living in them.

Q. Have cases come under your observation where the street has been raised by viaducts, or otherwise, leaving the adjacent property down at the foot of the embankment, if so state the effect on future development and improvement of such adjacent property?

A. As a rule if there is an existing house or structure on the property, the owners take their case to court often and obtain damages in that way or by direct settlement. As a matter of fact these settlements are practically for the full value of the property. The tendency is where the man receiving a lump sum for his damages to take the money and use it for his own purposes, and leave the property down and fill it up with perhaps a class of undesirable tenants and let the property deteriorate, which presents a bad appearance. My experience has been that this adjacent property is almost always left down in the hole. I recollect only one case where the property was improved to any extent along an elevated approach to the viaduct.

Q. On cross-examination some mention was made of difficulties of maintaining a railroad track where it was built in a cut below the ground water level. I believe you have experienced some difficulties on your railroad in that connection?

A. Yes, we have had very bad experience.

Q. I show you a picture, I think on your railroad, the Aetna Bridge at Cleveland. What is the conditions you wish to call attention to in connection to your railroad there?

A. This is our Cleveland Short Line—the Belt Line which we built 10 or 12 years ago. At this point we have just come over our elevation. We are elevated practically all the way for some 7 or 8 miles to connection with our main line. We are just coming off this elevation and up our maximum grade to reach the summit and run through some tunnels shown on the photograph, which I assume you will introduce in evidence.

(Photographs marked "Wabash Exhibits Nos. 17 and 18.)

The tunnel is at Broadway street. In this case we cut under the water level some five or six feet, and we had a terrifically hard time [fol. 379] in our construction work on account of the presence of water, and difficulty in draining it out during construction opera-

tions. We have been operating here since 1912, and had most disastrous experience and the utmost trouble in maintaining our track. There is constant presence of water that we can't get rid of. With our maximum grade of three-tenths per cent, and an adequate sewer outlet at the foot of this grade, we can't maintain our ditches. This softens up our track and gets it out of line and surface, and creates somewhat dangerous conditions; keeps side slopes soft and they slip and slide. We have spent thousands of dollars throwing on top of the cut and putting on a blanket of granulated slack, which is a by-product of gas furnaces; and in some measures we have held the slopes from the original slide we have encountered, but we still have a miserable wet condition and a sliding of the slope at the bottom. These pictures, I think, show the situation in very good shape.

Q. Under the City's plan of depression, I think it is shown that the tracks are to be laid approximately five feet below ground water level. Is it fair to assume that the same conditions will be encountered in the cut under the City's plan that the railroad has encountered in Cleveland?

A. I think it is very safe to assume that. Another thing I did not touch on. We had a city sewer running across this cut. We carried it on a bridge. This sewer was 4 or 5 feet in diameter. During the construction work, just after we had gotten our tracks laid preparatory to operation, and before we had completed the sewer, [fol. 380] the flume broke and the sewer got down in the cut and tore out the banks for about one thousand feet of double track, and the grade was only three-tenths per cent. In the case of Delmar avenue, I believe the grade is heavier—eight-tenths of one per cent.

Q. Are you able to say whether this eight-tenths of one per cent grade that the City imposes for all time to come on the Wabash is proper and reasonable railroad construction and operation?

A. Certainly not. We build our lines to three-tenths of one per cent and, I think, any grade over that or over five-tenths of one per cent is entirely improper in a situation like this.

Q. There is a special condition here with this bridge, the City has proposed here, in that it is fixed for all time to come and there is no possible way to reduce that grade?

A. Yes, it is fixed.

Q. Whereas a railroad may have out in the open a grade on its tracks at the present time in excess of that grade, yet at those places there is a possibility and the feasibility of reducing the grade when the development of traffic and the business to be handled over the road requires it, isn't that so?

A. There is generally that opportunity, and it is usually done.

I do not think an overhead clearance of 18 feet is reasonable and practical from a railroad standpoint. In most of the states through which we operate I think most of them have this regulated, and a 21-foot vertical clearance is the legal clearance. We, on our railroad, are insisting upon a 22-foot clearance from the top of the rail to under side of bridge. It is necessary to have some leeway for your subsequent raising and ballasting of tracks, etc.; in regard to the 16 [fol. 381] foot 3 inch clearance to which Mr. Richards testified to,

the legal clearance in Ohio is 21 feet. There is a provision that if the case is taken to court and both parties agree to accept a clearance as low as 16 feet 3 inches, it can be done. There is hardly any railroad that will agree to such a thing in this connection. I mention the Nickel Plate Railroad, which is a single-track road of somewhat lesser importance in our country, where most of our railroads are double track, on up to four main tracks, and that particular railroad handles all of their construction work on very minimum bases and have accepted this low clearance and have curtailed their railroad and made it a menace to their trainmen and to shipments of commercial freight forever. It is extremely bad practice and dangerous. Twenty-two-foot clearance is ordinarily spoken of as being required for the protection of railroad employes who have to perform their duties on top of box cars, freight cars, etc. Shipments of freight traffic, heavy machinery and that sort of freight that loads on flat or open cars hardly in themselves require full 21-foot clearances, but there are many shipments that exceed this space left by an 18-foot 3-inch clearance. The average box car above grade is about 12 feet. From the bottom of the box car it is about eight feet high as a rule, and the floor is about four feet above the rail.

Mr. Senti:

Q. You say that 22 feet is ordinarily spoken of as the proper clearance?

A. Twenty-one feet is generally spoken of, but we insist on 22 feet, and are generally accommodated in that. I said the Nickel Plate had accepted a reduction to that figure to lessen the cost of construction. We have on our Belt Line two or three cases where a lesser clearance was accepted. This was some fifteen years ago. I don't know the circumstances those two or three low clearances were accepted, but it was an enormous mistake. It would have warranted the expenditure of probably \$200,000 or \$300,000 to have gotten away from that.

I am not able to say how many bridges on our system, approximately, have as much as a 21-foot clearance. The greater proportion of them have a 21-foot clearance; there may be a few older ones, built years ago, that have a less clearance, but I actually do not know.

Q. What is the approximate date of the last bridge that was constructed with less than a 21-foot clearance on the Nickel Plate?

A. On the Nickel Plate they are building some now, I think. The last I actually known of was built about twelve years ago.

Q. As a matter of fact, you have a number of them entering New York now that are under construction with as low as 16-foot clearance, haven't you?

A. I don't know; but, if so, it is probably where passenger trains only operate. I can't say that we have some 16-foot clearance in the City of New York; I don't know.

Q. Who passed upon the propriety of the clearances in the most recent bridges that have been constructed by your line, to whose judgment was the clearance left?

A. As I have stated, in Ohio and in Indiana, and I think in every state, it is fixed by law 21 feet, and there has been no question about it.

Q. I mean where a lesser elevation has been adopted, who as [fol. 383] sented to it on account of the railroad?

A. With the exceptions I have spoken of, of the two or three constructed twelve or fifteen years ago, in which cases I don't know who permitted it, or why it was done. There have been no cases where a lesser clearance, to my knowledge has been employed.

I do not know the present per cent of grade of the Wabash Railroad in Forest Park; I do not know what the average grade of the Wabash Railroad is all over the system. The grade which every railroad desires is approximately three-tenths of one per cent and anything in excess of that is undesirable.

Q. In testifying in connection with that depressed stretch of railway there where you say the sewer bursted, you don't know what caused the sewer to break there?

A. Yes, our temporary flume by which we were carrying the water around while constructing the permanent sewer failed through some fault of construction; I don't remember what.

Q. Then it was the fault of construction of the flume rather than the location of the railroad that caused that?

A. Oh, yes; I simply cited that instance to show the disastrous affect of water pouring down such a cut on a grade which was lighter than any of the St. Louis cases. This stretch of track was located in the southerly part of Cleveland; am speaking only from memory; it is only one-half to two-thirds of a mile long. It runs from some ten feet at the start up to probably forty feet, and it will average twenty-five to thirty feet deep.

Q. This depth of forty feet is far in excess of anything contemplated in the Wabash Railroad tracks in the improvements here [fol. 384] under consideration, is it not?

A. Oh, yes. That tract was not sewered all the way. I understand that the plans presented by the City in this case provided for the area being sewered, but I don't think that to a great extent affects the condition of the cut. It will take off the water to a certain extent, but the soft condition will still exist, I think.

Q. You spoke of the condition in which property adjacent to streets where the grade has been changed is permitted to remain—you don't know what was done to the property in the immediate vicinity of the Tower Grove grade crossing in St. Louis after the grade was changed, do you?

A. No, I do not.

Q. The conditions which you mention there of permitting the property to remain in a dilapidated state had no reference to where the grades had been separated in St. Louis, did it?

A. No, no.

Q. Look at our Exhibit No. 39, which is a profile of the Wabash tracks from Grand avenue in the City of St. Louis to Ferguson and

see if you think it is probable that the grade will there be reduced to three-tenths of one per cent?

A. That is considerably below. I don't know the physical conditions or the possibilities for grade reduction. Almost any grade like that can have something done to it to its betterment. I don't know the relation of the track at the summit to the topography of the ground, or whether that summit can be reduced either by further depth or by cut or by tunnel. I assume that perhaps either or both methods could be used. However, each grade in itself is a problem to operation. The fact that we have a one per cent grade at one point does not mean it is economical or good practice to build a similar grade at another point. I don't think it will have any- [fol 385] thing to do with the feasibility of reducing the grade to the dimensions of three-tenths of one per cent, which is the grade all railroads desire. In hilly countries, countries that have certain physical situations, the conditions must be met, and steeper grades used, but three-tenths of one per cent is what the railroads would like to employ in various localities. There are steeper grades, of course.

Q. But the fact that it could not be attained in the grade separation of the Wabash tracks in St. Louis would not be a serious obstacle to the adoption of any plan, would it?

Objected to; objection overruled.

Commissioner Bean:

Q. Under the City plan, how far are the Wabash tracks below the grade at Delmar avenue?

A. Right where they are now.

Mr. Senti (Q.): The fact that it would not be feasible to attain three-tenths of one per cent grade between Forest Park and Delmar avenue would not be a serious obstacle in the way of the adoption of the City plan, would it?

A. I should say not.

I have testified that there is very little change, if any, in the character of property adjacent to the street that has been elevated. I think that applies to Chicago. I don't believe it has any effect on the character of structures that are erected on these properties adjacent to these elevations after they have been made. As a rule a man does not build a handsome residence adjacent to a railroad whether it is grade or otherwise. I think if a man would build a certain class of house adjacent to a railroad which was operating on top of the ground, he would be justified in building the same house [fol. 386] adjacent to an elevated railroad. I would not think he would be apt to build a house of high class and high cost adjacent to a railroad that had been depressed.

Q. As a matter of fact, there are a great many very desirable houses that have been erected in close proximity to the Wabash Railroad tracks near Delmar?

A. That is true and that is a peculiar situation there. The people have come down there and built themselves houses and apartments with the railroad existing there and has existed there for many years.

I spoke of the policy of our railroad wishing to conform to the wishes of the municipality in reference to grade separation, but of course we are anxious to put through a construction job at as reasonable cost and as economically as possible. I said we made a special effort to comply with the wishes of the municipality in so far as possible.

Q. You don't know what the policy of the City of St. Louis has been in this instance, do you?

Mr. Hall objects to this sort of cross-examination as uncalled for and unfair.

Mr. Haid admits this to be true, but states the gentleman is testifying to the policy of other railroads, and what other railroads may do can't be objected to here. It is to show what the Wabash might do and we have a right to know whether this witness knows what the policy of the Wabash has been.

Mr. Hall: With reference to the bridge in Forest Park over Grand drive, we maintain it is an attractive and as beautiful as you will find anywhere in this country, whether it is a bridge over a railroad or a bridge over a street, and that remark of council for the [fol. 387] City in intending to reproach the attitude of the Wabash is wholly uncalled for.

Objection overruled.

Q. When the smoke is emitted from the engine, is the tendency to cause a greater inconvenience and nuisance to the immediate abutting property increased or decreased by the lowering of tracks?

A. I think the nuisance is increased by lowering the tracks.

Q. When the tracks are elevated would you say that the smoke and soot and cinders are diffused over a lesser or a greater area of surrounding property?

A. I think they are diffused over a lesser area and for that reason the general tendency under ordinary conditions of smoke is to rise upward and of course with any currents of air it is blown one way or the other. The higher up from the ground and from the base of the surrounding structures that the smoke is emitted, the less chance it has to inconvenience or trouble anybody on the ground or any structure, for it is higher up and diffuses itself before it reaches these points. The same rule applies in a measure to soot and cinders; to what extent is rather a scientific question and would require a scientific reply and would be a matter of conjecture.

Q. You have stated in a measure and I think you could state within some reasonable measure.

A. I don't know, in going through the air how long soot holds its identity in a large particle or when it becomes diffused or broken up; on the question of cinders, there wouldn't be so much difference. If the tracks were depressed, I don't know whether the cinders at least would be thrown further than if they were elevated, or [fol. 388] not. My testimony dealt with the smoke blowing and

obscuring the vision in case of track depression. I said the lower the smoke is emitted the more it affects the things on the ground and the lower part of the structures. I don't know what soot and cinders would do exactly. I assume it is a nuisance to adjacent property owners, and it certainly would not be any better if the tracks were depressed than if they were elevated. I think that is a patent fact. The blast of the engine forces the cinders and soot into the air as they leave the smoke stack. I do not know the limits of the height to which they are sent.

Q. Look at his photograph. It is indicated on the back where it is. What does that photograph represent?

A. It is marked and I believe it is the Trumbull Avenue Bridge at Detroit, carrying the Michigan Central and the New York Central across the street. That is one of the bridges that was put in in the elimination of grades under my supervision. It is quite typical of the bridges we have put in in a locality of this character which is purely industrial. There is considerable street traffic in that vicinity.

Said photograph is marked "City Exhibit No. 107."

Witness is asked to identify another photograph.

A. That is marked Second avenue, and I believe it is where the Michigan Central and the New York Central cross over Second avenue in Detroit. That is one of the bridges constructed under my supervision in the elimination of grades. It is quite typical of the bridges we have erected in the City of Detroit. The name of the street that goes under the bridge is Second avenue, which as I recollect is quite a thoroughfare. There are industries there. In fact, [fol. 389] I believe we have a coal yard adjacent to that point, and have either a driveway leading up to this coal yard up this street or one of the adjacent streets. These were built quite a number of years ago, and I don't recollect all the facts. I think you could call it a boulevard. I don't know that our country has built any finer or any more ornate bridges in the City of Detroit over their highways, but that type of bridge is entirely in the hands of the city. It is entirely satisfactory to them, and I don't believe that there is any city in the country more beautiful than Detroit. I don't think they are the most beautiful in the country; you can make them more beautiful. We have more beautiful bridges in Cleveland, but those satisfy Detroit; they are what they want.

Said photographs are marked "City Exhibits Nos. 108 and 109."

Q. State what the picture Exhibit 109 represents?

A. It is the same street, Second Avenue, Detroit, another view of the same place apparently.

Q. City's Exhibit No. 110?

A. This photograph is marked Beaubien street, carrying the Michigan Central across the street of Detroit. That is one of the early bridges in Detroit. Personally I had nothing to do with this; that is entirely Michigan Central. It is built more or less on similar lines. The treatment I don't think is quite as good as some of the

other streets. The later structures are better designed and proportioned than this bridge. The City brought about the change. That territory is entirely industrial.

Mr. Brown:

Q. That question of bridge beauty is a matter of taste, isn't it?
[fol. 390] A. It is in a large measure, but by inference I would judge that these Detroit bridges are not thought beautiful, but they are what the City of Detroit thinks are beautiful. I might almost say the City of Detroit designed the character of the bridges and I think they are fine-looking structures, as I say a credit to the city and the locality in which they are built, they have been approved by the Grade Separation Commission of Detroit.

Mr. Rodehaver:

Q. You said you were more or less familiar with the situation in and around the City of St. Louis with reference to the railroad terminals?

A. In only a general way. The Big Four Railroad is a part of the New York Central System. My connection is with the New York Central and I am not familiar with the details of the Big Four at that end of the line. So far as I know, the Big Four comes into the north of East St. Louis through Granite City, and across over the Merchants Bridge and then around the river front. All the passenger trains I ride on come in that way. I don't know about the locals.

Q. Did you ever ride through the St. Louis tunnel?

A. Yes. I don't recollect whether they come out through a depression at this end. They are naturally under the ground right where they come out from the tunnel, and then on their way to the Union Station, I presume. I do not know as a matter of fact that from the time they come out of the tunnel until the station is reached they are in a depression. I have not ridden through the tunnel for probably 15 years.

Q. You haven't heard any complaints about the smoke obscuring the vision of your engineers while riding through that congested district, have you?

A. I wouldn't hear a thing about any phase of operation at [fol. 391] this point in St. Louis. I am not familiar with how the Pennsylvania gets in and out of Philadelphia or Baltimore. I don't know that they run through a depression in those cities.

Q. I believe you said a 16-foot clearance was enough for passenger trains, is that a fact?

A. In response to a question if it were not a fact, there were 16-foot clearances, I said if so, probably passenger trains operated there. I do not know whether they operate an occasional freight train through there. I only know through observation, from seeing passenger trains and freight trains operating through Forest Park as far as Delmar Station what the Wabash tracks are used for. I am hardly in the vicinity long enough to measure freight

trains by the day. I have seen quite a few in a day. I don't know that the average operated on that track is 16 passenger trains and 5 freight trains per day. I don't know that those 5 freight trains are nothing but little short switching crews.

Q. I believe you said that the situation regard to residential section in Chicago was peculiar in and of itself; that it was a high class residential district. How does your right of way in Chicago compare with the right of way of the Wabash in St. Louis in regard to residences?

A. I don't think there is any comparison at all. I don't even recollect any medium class residences adjacent to our line in Chicago.

Q. Take around from Forty-seventh to Sixty-third street, that was at one time pretty high class residential section, wasn't it?

A. Not to my memory; if so, it has greatly, or rather very properly become an industrial section. I don't think the elevation of [fol. 392] our tracks affected it as a residential proposition. I am there very frequently.

Q. You testified that along the Wabash east of Delmar, it was a dumping ground for tin cans, etc., owing to the depression of the tracks. Is that any different from the conditions along your right of way where your track is elevated in Chicago?

A. I think so, yes. In Chicago what residences are near there are to my memory rather poor residences. I don't think our right of way is practically a dumping ground.

Wabash Exhibit No. 19 marked.

C. B. BURDICK, recalled for cross-examination.

Mr. Senti: On account of the technical nature of questions to be propounded we would like for Mr. Horner, our engineer, to examine the witness.

Mr. Horner:

Q. In connection with your study you have prepared your report here; on page 16 you state that the 1915 flood appears to have been the greatest flood on the River des Peres on which any information is available. You say it is materially greater than any flood since 1897. Is it not also materially greater than any flood since 1847?

A. I don't know. I only judged by the information on the City's exhibit. I had four exhibits, I think. I believe I recall a tabulation of rainfall, but I don't know that I examined that exhibit particularly. I don't recall just what that table of rainfall shows. I did not examine that table carefully. My statement refers not to the rainfall, but to the high water. I don't remember any information [fol. 393] formation of floods prior to 1897. I believe the River des Peres flood of August, 1915, is greater than any flood on which I had information.

Q. Will you read the fourth paragraph on page 16 of your report?

Witness reads as follows:

"Upon the other hand somewhat greater floods are recorded in this region. There can be no assurance that they will not occur again, nor even that a greater flood may not occur, particularly when the water shed above Delmar is more fully developed."

Q. Also at the bottom of that page you show the flow was equivalent to 7,300 second feet per hour?

A. Not the rainfall but the run-off, yes sir. The average rainfall which produced the run-off was something like an inch an hour. I saw the record you exhibited, and it showed, I think, the average of about 0.85. On that basis the run-off in this case would be somewhere in the neighborhood of 86 per cent; but this run-off was not entirely the result of the rainfall during that storm but an accumulative result due to the fact that that rain had continued for several days. I took into consideration the saturation of the soil.

Q. What caused the flood was the rainfall a few hours preceding it, wasn't it?

A. Not entirely, but very largely so. I don't know that I would know whether any practical design of sewer could be used in this district to take care of the extra run-off in excess of 86. I will modify that and say, it would depend upon the size of the district [fol. 394] and the character of it. A roof can shed water practically 100 per cent, and there are some localities where a larger per cent would be justified. I think future development would increase the run-off materially. Take that district and improve it, and if the same circumstances occurred again as in 1915, you would have a materially larger run-off. That matter of percentage is just a tool that engineers use; it isn't anything entirely definite. We take a rainfall diagram such as you produced in your exhibits with varying extremes, that is, high figures for small periods, etc., and that is just a theoretical curve. It doesn't represent any storm that occurs; it is merely a probability of an average rainfall over certain periods and no one would attempt a percentage of such an intangible thing. You have given a figure for a run-off, and you assume a given figure on your curve and of course the percentage is in relation of one to the other. Any sewer designed to take care of 86 per cent would be a very high percentage of run-off.

Q. Referring to the floods which you illustrated at the bottom of that page, you show records of three floods in the Middle West of greater amount than that in the River des Peres of 1915. Referring to the first of these, is it not a fact that the measurements of the Devil's Creek flood are not considered accurate?

A. They were accurate enough to be published in the water supply papers of the United States. I had no connection with them, but it is a surprisingly large run-off and was shown by the geographical survey. I don't know that after further investigation a number [fol. 395] of authorities on that subject have excluded that flood

from their records. I don't know that Mr. Fuller in his paper on "Flood Flows" has excluded that and that Metcalf, Leonard and Eddy have done the same thing in the American sewerage practice. Decorah, Iowa, is the origin in connection with the second flood. I have not heard that that was not authentic either. These figures were made in our office; I didn't particularly work on it. I would consider that a reliable report. In the third case of Mill Creek at Erie, Penn., that is a watershed a little smaller than the River des Peres about 13 square miles against 15. It is practically the same. Records of rainfalls and floods indicate that as the size of the watersheds increase, the intensity of floods tends to diminish. I have not compared the topography of Mill Creek and River des Peres. I don't know if it would be possible to expect a flood of that character from a similar rain on the River des Peres. I simply mention this as a flood which has occurred. The conditions may not be entirely applicable to the River des Peres water. There are no two in the country exactly alike.

Q With the possibility of the first flood not being authentic and the Mill Creek flood not being entirely identical with the River des Peres flood, your four records take a high place, do they not, in the great floods of the country?

A The River des Peres is one of the largest one- in this region and I don't know of any larger except those I have mentioned here.

Witness, by request, reads page two B of his report, paragraph 7, as follows:

"In an improvement involving so large an expenditure as the [fol 396] grade separation of Delmar avenue, and the attendant depression of the Wabash tracks, it is our opinion that an adequate provision for great floods should be made with a reasonable factor of safety between the flood-water elevation and the plain at which it would enter the Wabash cut."

Paragraph 6 was read as follows:

"The 1915 flood was a very great flood, one which would probably seldom occur, but it is possible to have greater floods, particularly after the watershed above Delmar avenue is further improved. The City's plans for the ultimate drainage of this district provide for a flood of about 30 per cent greater than the flood of 1915, and propose to accommodate it at a flood-water elevation materially lower than now proposed in the plans for grade separation."

Q Do you consider that the provision for a flood 30 per cent greater than that of 1915 is adequate for a flood as great as outlined in your report?

A I think so. I would modify that and say that I have not studied the problem of what I consider an adequate water provision. I read your report on the improvement of the River des Peres, and it seemed like a sensible conclusion. In that report a flood of 9.500 second feet was provided for at the city limits.

Q You stated in your report that it is proposed to carry the flood at a considerable lower elevation. Do you recall how much?

A. There is an elevation of 64 at the city limits, I will say at the top of the sewer the elevation is 61 at the city limits, and an elevation of 60 at Kingsbury boulevard; an elevation of 61 at Delmar avenue. [fol. 397] Q That elevation of 61 at Delmar, which would be the high water under that scheme compared with the present track elevation of 74, would show a protection of 13 feet in that case, would it not? The flow of the River des Peres would be carried through 13 feet lower than the Wabash tracks?

A. I don't remember the elevation of the Wabash tracks.

Q I think it is in the record as 74 at that point.

A. Yes, that would be 13 feet; that would be adequate as to depth at that point.

Mr. Brown:

Q. Was that the same sewer they are proposing in the grade separation plan?

A. No, it is a sewer very much lower down than is shown in the City's plan for the grade separation.

Mr. Horner:

Q. You would say then that after the construction of the River des Peres sewer, as outlined in that report, that all the drainage requirements you suggested as advisable would have been met?

A I think that is so as far as the situation is at Delmar avenue. I don't know how low your sewer is down in De Baliviere, I haven't looked into it particularly there. It would appear to solve the question of the River des Peres flood breaking into the Wabash cuts.

Q Are you aware that the City is not proposing any construction except the viaduct at Delmar until the River des Peres sewer has been built?

A All I know is what the plans show.

Q. I think that has been stated and is in the records that the City has no intention to do any construction work except the viaduct at Delmar until the River des Peres sewer has been built.

Mr Hall: Where is that in the record, where and when and by whom was it put there.

[fol. 398] Mr. Senti: Mr. Bowen testified to it. I take it Mr. Commissioner, that should the City contemplate any further construction there is ample authority on the part of this Commission to make its future orders subject to whatever conditions the circumstances may warrant, and if the construction of the River des Peres sewer is necessary to make any of the improvements or changes in the grade contemplated south of Delmar, this Commission has authority to make the order conditional upon the City doing what they think ought to be done. The purpose is to show that any future improvements that may be contemplated or asked for there will be a practical way of meeting the requirements. The purpose of the River des Peres sewer is to show that it is feasible and to show that by the fixing of

the grade of the Wabash tracks at their present elevation at Delmar, nothing is going to happen that will prevent changes being made to the south. The purpose of the evidence is to show that it is a physical possibility to meet any conditions that may arise when the change is carried forward to the south.

Mr. Horner:

Q. With that understanding as to the ultimate construction of the River des Peres sewer, do you understand that your computations are for floods heavier than that which occurred in 1915? The computation which you enclosed with your report as to probable water elevation in the River des Peres channel and culvert, and as modified by culverts in the City's plan for elimination of the Delmar grade crossing, only they would be of interest in the very remote contingency of proceeding with the track elevation north of Delmar and the depression south of Delmar before the construction of the River des Peres sewer proper? They are of significance only to assume that the River des Peres sewer would not be built before the track elevation?

A. Yes, the computations don't apply only in that way, they were made on the assumption that is shown on the plans that I examined. It isn't depressed very much at Delmar, but the plans that I have considered in this report, and I understand we are considering in this case, is the plan for depressing the Wabash tracks for a long distance beginning at Delmar, and I think it is perfectly clear in my report and in the plans as to the circumstances under which my computations have been made. They refer to the whole flood being forced to go down the River des Peres.

Q. Your report not having been filed I wanted to bring that out. You understand the City's Primary Plan is to build a viaduct at Delmar and showing how ultimately the tracks could be built south of Delmar. The latter plans you have taken into consideration?

A. I have. I have a bunch of plans that show the whole project, not Delmar avenue alone. Table "E" of my report follows page 13, in the last column on that page the first figure elevation above the City datum is 67.50; I believe that was taken from the City profile.

Mr. Brown: What is the blue print you are now showing him?

Mr. Horner: It is the City's Exhibit No. 82.

The Witness: These computations were made last spring and apparently that figure, 67.50 was not taken from your Blue Print. My recollection is that that figure was taken from the City's profile, but apparently it is not on this profile. I observe that above the Lindell [fol. 400] Bridge you have figured your flood at 7.300 second feet and you have the elevation 71.40 and my figure at the same place is 71.49, about an inch higher, so however, we determine that elevation below the Transportation Bridge it must have been from your own calculations.

Q. You will note on the blue print an elevation of 67.55 recorded at one point. Could that be the one you use?

A. It may have been that figure. That is the elevation of the

4,300 second foot flood on your drawing. I am not sure whether that was the figure used; I think not.

Q. If that was used that would represent on this profile the elevation of the water at the highest side of the Transportation Bridge, would it not?

A. Yes, except the water is running over the road at a pretty good depth down there. It doesn't make such a great difference what the elevation is at that particular point.

Q. In your Table "E," you have allowed a loss through the Transportation Bridge of 1.4 feet. If you have misunderstood the information that was used in the City's elevation above the Transportation Bridge, wouldn't that make your computation be in error about that amount?

A. Yes, at the upper side of the Lindell Bridge. But there are other factors and conditions when taken into consideration might cause an agreement at that point and still not effect the lower end.

Q. It is a fact, however, that if that elevation of 67.50 at the lower end is not correct, that your error would apply all through your computations?

A. No, not at all. This very agreement here shows that that is [fol. 401] not so. An inference of a foot at this place, when you are using two or three-foot bridges on the way up is a very small difference. It is not an accumulative error.

Q. Your method of determining the probable elevation at Delmar is to start with the flood in Forest Park where it is comparatively still, as a basis, and to the elevation of that flood you add the loss calculated through each bridge, then the loss in the slope of the channel between the bridges and then the loss at the following bridges, and then add the figures in each case until you arrive at the elevation in Delmar avenue?

A. Yes.

Q. You start then with the elevation of the water in Forest Park, which is on the low side of the Transportation Bridge. If you had the wrong elevation at that point and you add the proper loss through the Transportation Bridge, you necessarily would have the wrong elevation on the high side of the bridge, would you not?

A. Somewhat, but less in error on the north side, and it would be less and less on every grade as you go up. Because the deeper the water the bigger your cross section and the bigger your cross section the slower the velocity and the slower the velocity, the slower the slope.

Q. In your tabulations you have used an average slope between Delmar and the Transportation Bridge. You applied that to all sections?

A. The slope is comparatively small.

Q. That slope still applies, even though you found the water level should have been 1.4 lower?

A. No, we only have a certain amount of fall in your 1915 flood—4,300 second feet and that was divided between the channel and the [fol. 402] bridges. If the bridges are more, the channels must have been less.

Q. In determining the fall advisable, through you have used the high-water marks on the City's Exhibits, have you not?

A. I think the check by the railroad companies furnish information in regard to that.

Q. If you use that to determine the total fall and used a higher figure to determine your fall, your computation would have to be in error in this case?

A. That would indicate that the flood, whatever it was went through that river with a less total resistance than was the actual facts and that would tend to indicate that a bigger flood would go through there with a less total resistance than if that error was made it would tend to throw my elevation too low at Delmar.

Q. You don't mean to say that starting with an elevation that was higher than the actual elevation of the Transportation Bridge, your computations would free you to get a computation lower at Delmar?

A. If I started too high that would indicate that the 4,300 second feet was forced through there with less head than actually did force that flood through there and by inference this would indicate a bigger flood could be forced through there than the flood I estimated. In a previous table where I applied the 4,300 second feet, I did not use the same elevation. At 4,300 second feet, the water would be lower than at 7,300 second feet.

Q. How did you determine that difference?

A. My recollection as I stated in my first testimony, I took from your profile, or I may have computed it; I think I did.
[fol. 403] Q. In any case, there is nothing in your report to justify your figure of 67.50?

A. Nothing except what I have mentioned in your report.

At this point an adjournment was taken until 1:30 p. m.

Mr. Horner:

Q. Refer to Table "E" of your report again. This Table "E" starts with an elevation of 67.50 below the Transportation Bridge, and you successively added friction losses in the channel, loss in the bridges up to the water main, and Kingsbury Bridge and through a section of channel and then through a short channel conduit; then at the entrance of the conduit and in that way determine the elevation at the upper end of the conduit above Delmar?

A. Yes.

Q. Using that in comparison with your Table "F"—you have taken the elevation of the water surface which you have computed below the Kingsbury Bridge and assuming the conduit extended down through the bridge you have eliminated the value of 4.4 of Table "F"—which was the loss at Kingsbury Bridge. In other words, you are starting with an elevation of 81.87 as the elevation of the water below the Kingsbury Bridge and without any further bridge losses you add the friction loss of 1.200 feet of conduit, that is the entrance loss which is given as 3.9? And then you arrive at the elevation for the flood plane about Delmar, that is, if the conduits extended to Kingsbury?

A. Yes, sir.

Q. Taking Table "E" and stepping back two lines, you give as the elevation of the water surface below the Waterman Bridge as 74.49. Is that correct?

A. Yes, I think that is correct.

[fol. 401] Q. Now, assuming the conduit extended down to the Waterman Bridge and to determine the elevation of the water existing above Delmar, you would then add an additional friction loss, would you not?

A. Yes, sir.

Q. Now that distance is given in your table as 650; in your table you show for a distance of 1,262 feet a further loss of one foot, is that correct?

A. This table does not show the length does it?

Q. Your Table "F".

A. Yes, that is correct.

Q. It shows an additional conduit length for 650 feet. You would have an additional friction loss of about one-half a foot, would you not?

A. A little more than; .7 of a foot—a half would probably be nearer; I do not think it would exceed .6 of a foot. Adding .6 of a foot for the friction loss in the conduit up to Kingsbury, one foot for the friction loss as shown in my table, and three and nine-tenths conduit loss to the 74.49 would be 79.99. Then, with the conduit extended down to Waterman Bridge, the water level about Delmar would not exceed 79.99 provided the conduits were properly joined to the culverts. I have assumed that in my report. The plans don't show that but I have assumed that in joining the sewer to the culverts that they would be done in a workmanlike sort of a way.

Q. That elevation of 79.99 is approximately 4 feet lower than the embankment shown on the City's plans, does it not?

A. Perhaps so.

Mr. Brown:

Q. Your attention was called to the fact that the plan of the City for the ultimate improvement of the River des Peres calls for taking care of approximately 30 per cent more water; as I understand [fol. 405] stand it no plan for the improvement of the River des Peres is shown by the viaduct- elevation plan, is that correct?

A. I don't know that I could exactly answer that question, it provides to take care of a 30 per cent more water than the flood of 1915. I think my testimony has been that the plans as made would not carry 7,300 feet without overflowing the cut. My investigation and report and testimony have been based upon the plan of this City as presented up to this hearing. My report makes no mention of any special investigation as to what may or may not happen if the River des Peres culvert is extended to below Waterman avenue, because it was not a part of the City plan at that time.

Q. Is it not a significant fact to you that the City in proposing the ultimate improvement of the River des Peres should plan to take care of 30 per cent more water than they plan to take care of in the viaduct plan for Delmar avenue?

A. Yes, I should think it was significant as to what they believed advisable to take care of; at least it is the opinion of the department that made that report. I think it emphasizes what I said in my direct testimony that in dealing with conditions such as exist out there, it is only just and reasonable that a margin of safety should be provided.

I have examined the profile of the River des Peres sewer this morning. It is very much lower than the River des Peres culvert shown on the Delmar viaduct plan.

Q. Would it be approximately correct to say that the top of that permanent sewer comes to about the bottom of the Delmar viaduct sewer?

[fol. 403] A. No, that is not quite true, but I don't believe I have any map here from which I can answer that question correctly; it is, I think, some twenty feet lower.

Q. What do you suppose is going to happen to this expensive culvert they are planning to put in that part of the Delmar avenue viaduct scheme.

A. It would have to be rebuilt to carry out the ultimate project or else the bottom would have to be extended down in some way. I don't know what program has been contemplated to lower it. If so, it would probably not be necessary to take out all the concrete that has been put there, but it would amount to practically constructing a new sewer at the lower elevation. It is true and perfectly manifest that this Delmar sewer as shown in the viaduct plan is entirely a different sewer from that shown in Mr. Horner's Exhibit No. 81, and I should think it would be fair to assume that a large part of the cost constructing this temporary sewer will be lost whenever, if ever, the City builds the permanent sewer.

Referring to conditions out there, it is not an ordinary sewer proposition, it is a special problem, and brought about by the fact that the natural channel of the River des Peres has been encroached upon by building, by filling below Delmar avenue, so that the channel is very much more restricted than it evidently was under a state of nature, and that accentuates the difficulty of building any improvements near Delmar without in a measure restoring conditions which probably existed there at one time.

Q. Isn't it true, in view of the topography of the territory north of Delmar and west of the Wabash tracks and in view of the presence of the railroad in such close proximity to the River des Peres, that [fol. 407] you must provide a proper margin of safety there, and perhaps a little more than you would under ordinary conditions that surround the building of an ordinary sewer?

A. Yes, I think the project big enough to warrant the improvement to be so proportioned that there can be no quibble about the adequacy of the plan. From investigation I believe the viaduct plan the City has presented for taking care of the River des Peres is not adequate, and does not provide any margin of safety.

Commissioner Bean:

Q. In what particular is it not adequate?

A. In that it does not provide sufficient waterway to take away

sufficient floods without overflowing it. It would not carry away a flood similar to that of 1915.

Mr. Brown:

Q. Isn't it also your opinion that it would flood the territory north of Delmar avenue to an extent greater than that shown by the flood map that Mr. Johnson introduced in evidence in Exhibits Nos. 2 and 3?

A. Yes. I don't recall the number of the exhibits, but I recall an exhibit was presented showing the land that would be covered by water standing at an elevation of 83.5 at Delmar, and obviously if the water was forced up higher, a bigger area would be flooded. Referring to Exhibit No. 2 under the flood conditions of 1915, provided the 200 acres is correct, a greater area would be flooded.

I stated that a repetition of the 1915 flood would, in my judgment, flood the Wabash cut. I testified that the 1915 flood did flood the cut, but the conditions would be altered when you put the railroad down in a hole and put up a wall at the upper end. The chance of danger would be greatly increased in this case.

[fol. 408] In so far as the present proposal to construct merely Delmar bridge, that matter of track depression would not be of interest; as I understand it, they don't propose to depress the tracks; that is, however, if they carry out the Delmar separation plan alone. There would be a greater tendency for the water to run down the tracks, going southeastwardly, toward Forest Park down to De Baliviere. The water separates right at Delmar and runs down the track toward De Baliviere, and another portion runs down a street south of the old channel of the River des Peres.

Mr. Horner:

Q. If a repetition of the 1915 flood occurred tomorrow, the water could go as it did in 1915, could it not?

A. Yes, sir.

C. W. ROEHRIG, being duly sworn, testified as follows:

Direct examination by Mr. Brown:

I have given my name to the reporter. I reside in St. Louis. I am a civil engineer and have been engaged in that work about 35 years. I am in business and have been for the past 10 or 15 years a consulting engineer. I have offices in this City. A portion of my time I spent in railroad engineering, a great portion. Most of the time has been spent in location, construction, operation and maintenance of railroads.

Q. Where has that experience been employed?

A. Pretty much throughout the country; about 25 years in the vicinity of St. Louis and that territory on the St. Louis and San [fol. 409] Francisco Railway. I have also spent a great many years

in Illinois, Pennsylvania and around Chicago; also Canada, Louisiana, Kansas and Oklahoma. My experience largely included matters of construction and maintenance of railroads; outside of railroad engineering I have had experience in contracting and engineering generally. I have resided in St. Louis almost 50 years.

Q. Are you familiar with the topography of the land on each side of the Wabash Railway between Delmar and Forest Park as it existed in 1900?

A. Yes; I am thoroughly familiar with conditions as they existed at that time for the reason that in 1902 and 1903 I was engineer on the works for grading that property from De Baliviere to Delmar and west of there. That was done by John Scott of Scott & Sons. That territory included from De Baliviere to west of the city limits, west of the Suburban line and from Delmar avenue on the north to the Rock Island on the south; that includes Nina place and the residential district from River des Peres west to Skinker road and west of Skinker road and what is known as the Parkview district; that whole territory was graded for the purpose of improving it as a residential district.

The River des Peres south of Delmar flowed in a tortuous winding course through the entire bottom from where it crosses Delmar at present, down to where it leaves the property at the bridge under the Rock Island. It did not have a well-defined channel. It ran through low, swampy and marshy ground and in places it spread out over the entire bottom and it was not in a defined channel at all in places. The present channel of the River des Peres was [fol. 410] made at the time that the construction was being done on the property.

The Wabash was located then as now, so far as the tracks are concerned.

Q. The railroad from present appearances looks as though it was in a cut down through there. What was the condition at that time?

A. It was in a fill all through from De Baliviere to Delmar ranging from about grade at De Baliviere west and north of there it was on a fill all the way from 4 to 9 or 10 feet. That fill was on this soft, swampy ground I spoke of.

In this grading improvement the channel was straightened and put in its present location and new banks were built, necessarily on account of the filling in the property on either side. It was filled on the west and east sides up to the Wabash right of way. That accounts for the present appearance of the Wabash Railroad being in a cut through there; that entire tract of land in that vicinity of the present River des Peres was filled from a height of 10 to 18 feet.

Q. On the west side of present channel of the River des Peres, how deep was the filling?

A. Part of that was in the fill and part in the cut. Certain portion of it, especially at the southern end, ran close to the edge of the hill and it was crowded right up against the foot of the hill there at the south end of present channel. It is true that the soil beneath the subgrade of the railroad track in that territory is soft and swampy, marshy and wet. Water stands all over that land in there.

Q. What effect does the fact that this ground has been filled in [fol. 411] on each side of the River des Peres and Wabash right of way have as to water coming through that fill? Does it have a tendency to come through there on the filled land more than on solid?

A. Oh, yes. It is more porous and open. The embankment isn't settled and firm as the natural ground in the cuts.

In filling in and straightening the River des Peres they made the channel about the same width as south of the Rock Island.

Q. In the territory where it originally spread out for a considerable area, they confined that to a narrow channel?

A. Certainly that was confined after the fill was made.

I have been employed by the Wabash Railroad Company, as a consulting engineer to make an examination of the City's proposed plan for grade separation not only at Delmar but the entire City plan. I have some comment to make on the City's plan.

Q. Will you take them up in your own way and make such statements as you care to?

A. After a thorough and comprehensive study of the City plan for treating the Wabash Railroad, I have arrived at the conclusion that the proposed plan of raising the Wabash tracks by the Wabash plan is far better from every standpoint, both the City and railroad standpoint, than a depressed track, for the following reasons:

In the first place there will be more smoke and noise in the City plan than in the Wabash plan for the reason that the City plan depresses the tracks below natural surface and there would be a difference of about 40 feet in elevation between the City's plan and the Wabash plan. The smoke would have to rise 40 feet higher before [fol. 412] it got away from the houses and surrounding territory. Naturally there would be more noise and smoke in the City's plan than the Wabash plan for the reason that the former provides for much stiffer grades than the Wabash plan. The City's plan contemplates using 8/10 of 1 per cent grade both from Kingshighway going west to Union, or thereabout. That is a down grade, and then from a point between De Baliviere and Delmar going west and ascending a grade of 8/10 of 1 per cent; that is carried north a'out a distance of something over 2 miles beyond the city limits. That would naturally create more smoke and noise than the Wabash plan, which is very nearly a level grade. In fact the grade of the Wabash as proposed by the Wabash plan would be about 9.5 feet per mile. I also think there would be a greater danger to trespassers in the City plan. The City plan contemplates putting the Wabash in a depression and this would be especially dangerous to trespassers in Forest Park where the chances of children getting on the track would be very great and it is much simpler and easier for a person to get out of the way of an approaching train on a fill than in a cut.

Furthermore, I think the depression as contemplated by the City plan would be much more unsightly than the fill in the Wabash plan. From Union avenue to Delmar, according to City plan there would be a very deep cut of about 23 to 24 feet, I think. This would be to my idea very unsightly and very unaesthetic and

would mean that there would be a good place for a public dump and the people in that vicinity would dump old cans and debris of [fol. 413] all sorts by the side of the bank as was shown very clearly what happens there between De Baliviere and Delmar. That condition actually exists there today.

I also think there would be more obstruction to view in the City plan. The Wabash plan contemplates only one fill for the entire length while under the City plan that would be necessary to create 42 separate embankments on account of raising the street grades and grades of connecting streets and alleys in order to carry Delmar avenue, De Baliviere, Union and various other streets over the Wabash tracks. I have a blue print that will show the situation.

Marked "Wabash Exhibit 20."

This plan (Exhibit 20) shows the one Wabash embankment under the Wabash plan, colored in yellow and the various streets and alleys that would be required under City plan are colored in red, for an 18-foot clearance and in green for a 22-foot clearance. The tables on the map show the various embankments giving the heights for 18-foot clearance, also the 22-foot clearance, and the length of each, and also has summaries showing that the 42 embankments formed by the City plan and shown colored in red on the map, for an 18-foot clearance you would have a total length of 18,895 feet, with a maximum height of 24 feet; and for a 22-foot clearance the 42 embankments would have a total length of 22,805 feet, with a maximum height of 28 feet. The one embankment formed by the Wabash plan is shown colored in yellow, and the map has a total length of 10,900 feet, with maximum height of 30 feet. That is all shown in detail on the tables on the map.

[fol. 414] The next point was that there would be, in my opinion more vibrations caused by the passing of trains under the City plan, than under the Wabash plan, especially in that part between De Baliviere and Delmar, for the reason as stated heretofore, that the original ground in through there was soft and marshy and swampy and the City's plan of depressing the tracks would throw the Wabash tracks down below the natural surface of this low, swampy ground. As stated, the present ground is all made and filled up to a height varying from 10 to 18 feet and, in my opinion, there would be chances of vibrations affecting the building on this fill a great deal more under the City than the Wabash plan.

Q. It is your idea, generally speaking, that there is more vibrations from the operation of a train from a cut than on an elevated embankment?

A. Generally speaking that is so and in this particular case on account of the nature of the ground and also the high fill on either side.

Q. So those buildings on that filled ground adjacent thereto would show a tendency to fall?

A. I understand a great many are affected and show signs of cracks in the foundations. I also think that the bridges under the City

plan, that is, carrying the streets over the railroad tracks, would be more unsightly than the bridges under the Wabash plan, which carries the railroad over the streets. The smoke and gas would have quite an effect on the appearance of these bridges and the engines passing underneath would soon have them discolored and show black and unsightly streets.

I think this is shown very conclusively by the two photographs [fol. 415] that are filed by the City in this case, Exhibit No. 27, which shows a comparatively recent bridge on Chouteau and Exhibit No. 29 which shows a bridge at Southwest avenue, over the Missouri Pacific tracks. These two photographs show this point very clearly, that I have tried to bring out so far as unsightliness and the aesthetic features are concerned.

It is a very good illustration and a very correct one that, as Mr. Richards said yesterday, no matter how much ornamentation is put on these things, the smoke from the locomotives passing underneath will soon discolor and blacken it. I think the City's information as shown in their Exhibit 83 and also the Wabash investigations show that the ground water run is about 5 feet above proposed grade of the tracks, under the City plan. This would be very objectionable for the reason that it would be very costly to maintain the tracks and road in a wet cut and would be a hard matter to keep it in line and surface. The slopes would sluff off and slide into the ditches and fill up your ditches and obstruct the drainage and would be very objectionable from an operating standpoint as well as maintenance.

I heard Mr. Currier's testimony on that point this morning; my views coincide closely with his.

Under the City plan there would constantly be a danger and menace of the Wabash being put out of business entirely by the overflow of the River des Peres coming down and getting into the Wabash cut and filling it up with water that would take some time to get out, for the reason that the only method of draining that out provided is a 42-inch sewer about two miles long through Forest Park. The [fol. 416] purpose of that was to take care of the surface drainage that comes down that cut and it is scarcely sufficient, or not more than sufficient, to take care of the ordinary surface drainage of ordinary heavy rains and it is not intended or expected to take care of any flood waters of the River des Peres.

Q. Is that sufficient, that sewer, to take care of any drainage that may be passed into the Wabash cut from the Rock Island?

A. No, I don't think it would be. Any water that was carried in from drainage from the Rock Island, the 42-inch sewer, would be scarcely sufficient for that. It was designed to take care of ordinary surface drainage in the Wabash cut alone. This 42-inch sewer as contemplated by the City plan is estimated, according to City plan, at a cost of \$330,000.00 or \$335,000.00, which would be absolutely useless and unnecessary if the River des Peres sewer was built before this construction was made.

In case the 42-inch sewer was built first, and afterward sewer the River des Peres, all that would be necessary to take care of the surface drainage would be to make short direct connections with the

River des Peres sewer instead of running that two miles in a 42-inch sewer. We do not know what the City will ultimately do with the River des Peres. The cost of the City plan is very excessive as compared with the Wabash plan and would be something like 75 or 80 per cent more than the cost of the Wabash plan—that is another objection.

There is no compensating gain that I can see, or that has been disclosed to justify this extra expenditure.

[fol. 417] Q. Have you overlooked the fact that the City says the railroad will be more beautiful in a cut than on an embankment?

A. No, I don't think so. I think they set that up as a full and complete compensation for all disadvantages.

Mr. Haid: The railroad would not be more beautiful, but the territory would.

The Witness: The mere sight of a passing train, especially a passenger train, is not objectionable. On the contrary it is a pleasing and interesting sight. What is objectionable is not the proximity of the railroad, but the smoke and noise and danger; I think all three of these points will be greatly increased under the City plan than under the Wabash plan.

Another point is that by the City plan the view of passengers on trains coming in and going out of St. Louis will be obstructed, and one would not be able to get a view of the beautiful residence portion of St. Louis, or Forest Park, which I think is desirable from the standpoint of civic pride.

Q. I understand the City of St. Louis doesn't care anything about the impression the travelers get of the view, is that a fact? In other cities that is a matter of considerable importance?

A. It is deemed a matter of importance in other cities, and I think it is also in St. Louis, although in this particular case it does not seem to be so.

Mr. Rodehaver: Are you thinking of Chicago when you made that remark?

A. I am thinking of all cities in general. The desire is to have strangers that come into the city get as good an impression of the city as possible, and they certainly get a good impression of the [fol. 418] City of St. Louis in coming in on the Wabash tracks if they have an unobstructed view of Forest Park and the beautiful residence section adjacent thereto.

If the Wabash depressed its tracks in Chicago the same condition would prevail as in St. Louis, you would not be able to see anything.

Under the Wabash plan there will be no closing of streets or interruptions to street traffic while the construction is going on or is in progress, while under the City plan the streets will be closed to all traffic for a period of perhaps two years. Experience in St. Louis shows that it takes two years, or seasons, to build a viaduct similar to the one at Delmar. In the meantime all street cars and vehicular traffic would have to be diverted on Delmar from a point at about Hamilton to Skinker road, and that would be very objec-

tionable to both the traveling public and also to business interests along the street. A great many of them no doubt would suffer to a very large extent; the cafeterias, the Park Theater and three oil-filling stations down at Delmar and De Giverville, in my opinion, would practically be put out of business by having the street traffic diverted for a period of two years.

The Park Theater was operating last winter. They usually close during the summer, and I don't know whether they have been operating this fall or not.

Street car traffic would have to be diverted and the probabilities are they would divert traffic and send Delmar street cars south on De Baliviere over the University to Skinker road and out on Delmar to the terminus, and back the same way.

Q. There would be a territory, then, between Hamilton and [fol. 419] Skinker road that would not be served by street cars at all?

A. Yes; you might say from De Baliviere to Skinker. The City Limits line is in the same condition and they would probably have to run them east on Delmar from Hamilton to De Baliviere down and out over the University line to Skinker road and on its regular route from there.

Mr. Haid:

Q. Would there be any difficulty to most of the people living west of the River des Peres, whether they took the car on Skinker road or whether they took it on Delmar?

A. For that part of the city west, probably not.

Mr. Haid:

Q. You said that would all be affected?

A. I said from De Baliviere to Skinker road. South of Delmar place there would be no difficulty, but there is quite a territory north of Delmar that would be affected. All that territory north of Delmar would be affected.

Mr. Haid:

Q. There are no cars, then, on Hamilton?

A. Yes, sir.

Mr. Haid:

Q. Then, practically nothing would be affected except two or three houses west of the Wabash station?

A. No, they would go to Hamilton avenue. For instance, they would probably have to take a transfer and transfer at De Baliviere on a Delmar car, because they would divert the Delmar cars down around De Baliviere and it would be much more inconvenient to have to transfer than to get a through car.

Mr. Haid:

Q. You are now aware, then, that in many instances all those living west of De Baliviere have to transfer now?

A. A great many come from some distance and have to transfer.

Mr. Brown:

Q. The Delmar line operates through to old Delmar Garden, and [fol. 420] to University City, doesn't it?

A. Yes, sir. During the construction of this Delmar viaduct perhaps it would not be possible to operate those cars through. It is a considerable distance, from 6,000 to 6,200, very long blocks.

Q. And all the territory south of Delmar in that district would be affected, and all those people that now go north and take the street car at Delmar?

A. About half of that. If the cars were diverted you would have to go to the University line or west to Skinker. Under the Wabash plan there will be no consequential damages to adjacent property, while under the City plan there will be considerable, as shown by their Exhibit 32, which places the total amount of damages to adjacent property for Delmar avenue alone, I believe, at \$131,000.00 and net damages \$89,000.00. Certainly under Wabash plan there will be none of this damage to adjacent property. Street grades will remain the same as now and there will be no damage to adjacent property on that account.

Under the Wabash plan the full use of the width of the right of way permits four tracks by building retaining walls. Under City plan this would be impossible.

There are a number of objections in the City's method of doing the construction for the proposed tracks. First is the plan for grading. They propose to lay a temporary operating track on the north bank, north of the Wabash tracks, in the alley from Union to De Baliviere. This is impracticable for the reason that this track would be very close to the edge of the cut; in fact, part of the track in places would be over the edge of the cut, as shown by maps that [fol. 421] have been filed by the City; further, this track would be damaged and would take considerable improved property. For instance, at De Baliviere, on the west side, it would cut through a new garage, a brick structure and quite a substantial affair; on the west side of De Baliviere it would cut right through an oil-filling station that is improved with a very good building and other improvements there. You couldn't go out of the alley and get further away without encroaching on private property, all the way with considerably more damage.

The method adopted and outlined by the City for making the fill north of Delmar is impracticable; I might say almost impossible. Their plan contemplates making this fill by dumping dirt alongside of the tracks, as they are at present, then raising the tracks and shoveling the dirt underneath until they get the embankment to required height. This would be feasible, although I don't think it the cheapest plan; if it wasn't for crossing of Olive Street road—but this would make this plan impractical, almost impossible; I don't

see how they would do it without building a temporary trestle from Delmar to Olive Street road and also on the north side of Olive Street road.

Q. Their estimates make no allowance for that?

A. No. Furthermore, their plan for doing the excavating for the cut between Union and De Baliviere contemplates taking this out with a steam shovel from Union avenue end and working westwardly. For the temporary drainage for the cut they propose putting in a drain and connecting it with the Blackstone sewer at Union ave- [fol. 422] nue. This would be impossible, because Blackstone sewer at Union avenue is higher than the cut will be; it is about five feet higher. The City plan provides for taking off this part and putting on a flat top, but even at that, there is a slightly descending grade in the City plan from Union to De Baliviere and all that waste drainage was intended to be taken care of by this 42-inch sewer at De Baliviere. The drainage ran west. The result would be during construction, if they undertook to drain the cut into Blackstone sewer instead of draining their cut, they would also be in danger of water backing into the cut from Blackstone sewer, flooding the cut during construction, and keeping it flooded instead of drained.

Q. What effect would cutting off the top of Blackstone sewer have?

A. It would reduce the capacity of Blackstone sewer at that place and would choke it up and would not permit so much water to flow through it as does at present under present conditions. It would increase the danger and the menace of the water backing out of Blackstone sewer and being forced out at all manhole openings and covering a vast amount of territory in that vicinity. Blackstone sewer, I believe, is taxed to its full capacity, and a little more, at present.

The City's plan of separation of grade at Delmar avenue takes care only of Delmar avenue itself, and separates the grade at that point alone, while under Wabash plan for separation of Delmar avenue grade, on account of raising the embankments and tracks on either side of Delmar, it would permit the separation of the street grade and railroad at Hamilton avenue at the same time as at Delmar. This is [fol. 423] almost as important as the Delmar avenue grade separation, on account of the Hamilton School being located at Hamilton and Westminster, and there are a great many children that attend that school from Nina place and all through that territory south and west of the Wabash tracks, who would have to cross the Wabash tracks at Hamilton avenue.

Under the Wabash plan the work of separation of street grades can be done in sections, one street at a time. After Delmar is separated, they could take up De Baliviere and then the next one, doing it in portions. They could complete Delmar, then Union and Lindell, and finish one at a time. Under City plan all work must be done simultaneously from Kingshighway to city limits after the Delmar avenue plan is eliminated.

I think the proposed embankment of the Wabash through Forest Park is susceptible to aesthetic treatment as the two embankments proposed under City plan through Forest Park, one on each side of

the tracks. I think it just as easy to beautify one embankment as it would two. City plan provides for only an 18-foot clearance for railroad at various street crossings. The recognized American railway standard at present is 22 feet, and I think this is also the recognized standard of the City of St. Louis. Bridges at late construction in St. Louis are based on that 22-foot clearance. The table of clearance as submitted by Mr. Bowen for the City, Exhibit 41, I think it is, is wrong and misleading. It has a column of maximum clearances, but in this column no place does he show a maximum clearance greater than 22 feet. All tables I have ever seen prepared [fol. 424] have this column, headed "Clearance of 22 feet and over." I think Mr. Bowen in his table included everything over 22-foot clearances as being 22-foot maximum clearances.

Q. For a 28-foot clearance it shows in his report or table as 22?

A. Yes, and for the same reason his column of average clearance in the same exhibit would be wrong and misleading; and one instance of this that I have in mind is in City Exhibit 30, filed in this case by the City. Their profile, I believe, was referred to a few minutes ago by Mr. Burdick or Mr. Currier. This shows a clearance at Grand avenue of 33½ feet, while on this table of Mr. Bowen in Exhibit 41 it shows a maximum clearance of only 22 feet. In that way he reduces his average. It doesn't show any clearances over 22 feet. I have seen a great many of those statistics and they are always headed "Bridges with 22 feet and over." They should show actual clearance; in this case they don't show anything over 22 feet. City plan, Exhibit No. 9, I believe, shows the areas of the waterway under present Delmar Bridge over River des Peres as being figured from the bottom of the center truss. This same map and blue print show that originally the water areas of the waterway were figured from the bottom of the floor stringers, making due allowance for the area occupied by the center truss, and also by certain water pipes below floor stringers.

Q. What is the center truss you are talking about?

A. The center truss extends down below the bottom of the floor stringers. They are braced in the form of a truss with large openings [fol. 425] in between, a couple of feet or more, I think is my recollection. I don't know exactly the size. The original method of calculating the area of the waterway as shown on that blue print is correct, but the method they adopted they cut down the area of the waterway about 50 per cent and made it a great deal less than it actually is. That would have the effect on this same map that they show the area of the proposed River des Peres culvert at Delmar avenue, that is, it would have the effect of showing or providing for a vastly greater amount of waterway for the River des Peres than what it has now, while actually I don't think it is so. That condition would prevail only in that case. Portions of the center truss would be blocked by floating debris so no water could get through there at all. I don't think that condition ever has, or ever will prevail, for the reason that the River des Peres runs through a highly improved property; there are no farms, forests or timbered country that would make it necessary to carry a great deal of debris and fill that up. That center truss does not affect the flow of the water materially.

Q. If the area of the Delmar Bridge was computed at the bottom of the floor stringers, what would the flow area be?

A. The area that was originally figured by the City as shown on this map under the south truss was 492 square feet and under the changed method of calculation it shows 260 square feet. The River des Peres culvert is 658 square feet as shown on this same blue print.

The point I wish to make is that it seems to create the impression that it is increasing the area of the waterway from 260 square feet, whereas it is only increasing it from 492 square feet to 658 square feet.

[fol. 426] In City Exhibits 2 and 3, which show the traffic for a 16-hour period at 7 a. m. to 11 p. m. at Delmar, and the various other streets clear through to Union, there seems to be some discrepancy that is hard to understand. For instance, this table shows that the crossing at De Baliviere is blocked 6 minutes a day by the trains and at Hamilton only 2 minutes a day, while the time that the Delmar crossing is blocked by trains is 37 minutes. There seems to be quite a discrepancy there, especially between Hamilton and De Baliviere. Further in the testimony of Mr. Bowen, I think it was, one of the City's witnesses, stated that all westbound trains of the Wabash Railroad blocked the Delmar avenue crossing. I think this is a mistake.

Mr. Hall: He corrected that afterwards in the corrections he offered yesterday.

A. Oh, did he? I will withdraw that part of my examination then referring to the blocking of the crossings by westbound trains.

In this table there seems to be another part of it that is inaccurate and unreliable for the reason that for the same day, namely October 29, 1920, while it shows 20 trains at Waterman, it shows only 13 at Lindell. That surely must have been an error, for there are as many trains at Lindell crossing as there are at Waterman; while on the next day it shows 28 trains at Union, which is practically the same as Lindell, one day 13 and the next 28 trains.

Also, on October 29th, it shows 22 trains at Hamilton and only 21 at De Baliviere. There are just as many at De Baliviere as at Hamilton and if their table is intended to include the Rock Island trains, there would be more trains at De Baliviere than at Hamilton. [fol. 427] ton.

Mr. Hall: The time of blocking of trains at De Baliviere is much greater in the case of the Rock Island because of the fact that the Rock Island trains stop at De Baliviere at their station just west of De Baliviere, whereas the Wabash trains do not stop at De Baliviere, and the crossing gates would necessarily be down longer for trains that were stopping at that De Baliviere crossing of the Rock Island than they would for the crossing of De Baliviere by the Wabash trains which do not stop there.

Q. You spoke, Mr. Roehrig, about the detouring of the street cars during the progress of the raising of Delmar boulevard. The cars on Delmar westbound would turn south at De Baliviere until

they intersect with the University Line on Pershing and run west on the University Line to Skinker road and then north on Skinker road to Delmar and continue the usual course west on Delmar?

A. Yes, sir. It is about six blocks south from Delmar to Pershing, and on Skinker it is about six and one-half blocks north from the University tracks to Delmar.

Q. About what length of time do you think it would take to make that detour above the ordinary time for a trip on the Delmar cars going west?

A. I believe that would make the trip from five to ten minutes longer.

Q. If it took ten minutes longer to make that detour and there were 33,000 passengers carried a day over these cars, according to the testimony of Mr. Bowen, as shown on page 61 of the transcript, there would be an economic loss of 5,500 hours per day by reason of that detour, as compared with an economic loss of 412.75 [fol. 428] hours per day by reason of the delay in crossing the Delmar tracks?

A. There would be a great difference; I have not figured it out. I will take your word for it.

Cross-examination by Mr. Senti:

Q. This economic loss that you testified to in response to Mr. Hall's question, that is a matter that would continue only during the period of construction, is it not?

A. For a period of about two years during construction.

Q. Would that two years be involved in the construction of the Delmar viaduct alone?

A. Yes, sir.

Q. And the consequent loss would only relate to that time of construction?

A. To the time of construction, as an economic loss.

Q. It would not be an insurmountable obstacle in the way of adoption of the plan submitted by the City, would it?

A. No, it simply would be objectionable, though. I think it will be a material objection to a great many people for a period of two years. I think it would be of sufficient importance to be a factor in the choice or means of separating the grade at this point. I consider it an important factor, but I won't say it is the most important, both from an economic standpoint to the business houses along Delmar all the way from De Belviere to Skinker. Not only the street car traffic will be detoured, but also the vehicular traffic of all kinds and some of those business houses on Delmar I imagine will be disturbed considerably by that arrangement of taking the traffic off the street for that period.

[fol. 429] As I stated, the three oil-filling stations will be put out of business entirely.

Q. How long a period of time do you think would be necessary for them to raise the Wabash tracks at that point?

A. That is immaterial how long it will take to raise the Wabash tracks because the Wabash does not propose to stop traffic at all

at that place. They are going to raise up the tracks without interfering with traffic on the streets at all.

Q. Did you make any computations of the amount of traffic at the different crossings in reference to which you have testified, from Mr. Bowen's report there?

A. I took the City's figures and I made some computations from that. I did not make an actual count of traffic at these points.

Q. Do you know how many overhead bridges there are over railroads in the City of St. Louis that are more than 18 feet clearance?

A. I know some of them. I know the Vandeventer, the Tower Grove and the Twelfth street; they are all over 18 feet and the proposed new viaduct over Fourteenth street proposes a clearance of something like 26 feet, according to the City's plans. I don't know about the proposed Wabash Bridge on St. Charles rock road. I don't know anything about an 18-foot clearance.

Q. You spoke of it being easier to ornament one embankment than two, in Forest Park.

A. I think I said it was just as easy, yes.

Q. Do you think that the question of keeping those embankments so as to present a good appearance would be affected to any extent by the fact that the railroad was on top of one of the embankments and wasn't on the other?

A. I don't think the railroad itself makes it objectionable on [fol. 43] either side. It is the smoke and noise and the danger that makes it objectionable.

Q. Do you think it would be just as easy to keep the embankment upon which a railroad was laid which was being use for traffic in as pleasing condition as to appearance as it would one over which there was no railroad?

A. I think so, yes.

Q. You spoke of the comparative necessity of separation of the grades at Hamilton and Delmar. In your opinion, would you say it is as necessary to eliminate the grade crossing at Hamilton as it is at Delmar?

A. I said it was almost as important on account of the great number of school children that use that crossing.

Q. The Hamilton avenue crossing is more or less a menace to school children?

A. It is dangerous to a certain extent, as all crossings are. There are grade crossings in populous sections.

Q. You spoke of fissures or cracks or something in the apartment houses that had been erected near the Wabash railroad tracks. Did you make any investigation as to what caused those cracks?

A. No, but I have heard a great deal on that score for a great number of years because I was specially interested in it, having been engineer on that work when it was being done and I often wondered how those houses stood up on that big fill and so I was specially interested in it from that point of view. I have made quit a number of inquiries from time to time from people I saw, but I never went out and made any technical investigation.

Q. Your interest emanated rather from the fact that it was the

[fol. 431] ground you had filled, than any connection with the vibrations of railroads, was it not?

A. Oh, yes; it was made extending through a period of 15 to 18 years; ever since I did it, the work was in 1902 or 1903.

Q. As a matter of fact you don't know whether those cracks were caused by vibrations of the railroad or whether from defects in construction?

A. Not from personal knowledge; only from hearsay and from what I have been told and forming my own opinion of it; not from any personal investigation or observation.

Q. Did you make any calculations upon the basis of the floods at the different periods?

A. Overflow of the River des Peres? No.

I never claimed to be a hydraulic engineer, although I know something about it. I think I do.

Q. In testifying concerning that 42-inch sewer, I believe your statement was that it was scarcely sufficient to carry off the water?

A. I didn't make that calculation. I got that from the City's testimony that that was the purpose of the 42-inch sewer; that the sole purpose was to carry off that surface drainage and from Mr. Burdick's figures, I believe he stated it would only be sufficient to carry off the surface drainage in ordinary heavy rains, and not excessive heavy rains, and it won't be sufficient if the Rock Island sewer is connected with it. I said it would be scarcely sufficient. I believe Mr. Burdick said it would not be sufficient. Perhaps I said the 42-inch sewer was scarcely sufficient to carry off the drainage. It would carry off the water in ordinary heavy rains, but in unusual heavy rains it will not take care of sufficient drainage. It would be insufficient at that time.

[fol. 432] Q. You have changed your opinion?

A. From that standpoint, it is already.

Q. You spoke of conditions in Forest Park as to the danger of people entering on the right of way of the Wabash Railroad and referred from time to time to the Wabash plan. I wish you would state just how the Wabash plan proposes to carry its railroad tracks through Forest Park?

A. It is proposed to leave the Wabash tracks and embankment the same as it is now.

Q. At the same elevation?

A. From Kingshighway to Grand drive and from the bridge over Grand drive and Forest Park. That would be going westerly from Kingshighway to Grand drive. They would leave them the same as they are now; the same height and there would be no disturbance; either lateral or vertical; from that point on they will be raised gradually on a slightly ascending grade to the west toward Union avenue over the present location of the Wabash tracks. It would leave the tracks at the same grade.

Q. The grade of the surface of the surrounding ground?

A. Yes, the same there from Kingshighway to Grand drive, as it is now. That is on an embankment all the way; Grand drive goes under the Wabash track there. The Wabash is probably 18

feet above the surface of Grand drive. These tracks going eastwardly to the point where they leave the park enter a tunnel under Kingshighway. They reach the tunnel and Grand drive. There is a point there that engineers say is a grade point where the grade of the tracks and the grade of the natural ground are identical.

[fol. 433] Q. What would be your idea of the relative conditions as to danger at that point and the conditions as to danger if the tracks were depressed?

A. At that point? There doesn't seem to be very much danger there because that is a portion of the park not much used or frequented by people. It is rather unimproved along in there and you don't ever see many people around that particular part of the park.

I don't think it is a fact that the topography prevents more people from passing there in that part of the track.

Q. You mentioned the different elements that entered into the different costs. What is the cost of the contemplated Wabash plan?

A. I haven't got the exact figures now, but my recollection is in the neighborhood of \$1,700,000. You mean for the entire project; you don't mean for Delmar alone, do you?

Q. You didn't specify whether it was for Delmar alone or for the scheme as carried out in its entirety as to Forest Park? Did you make any computations as to the relative cost of the erection of the viaduct with the other work necessary to eliminate the grade crossing at Delmar under the plan proposed by the City and the plan proposed by the Wabash?

A. I didn't make those myself although I have had the results of these calculations given me.

Q. Would it be feasible to carry out the elimination of the grade crossing at Delmar avenue alone under the Wabash plan without extending the project at that time to any other point?

A. You would have to extend it a distance on either side of Delmar avenue, necessarily, in order to get down from the proposed grade of the Wabash tracks to the present grade of the Wabash tracks. It would have to be changed all the way to De Paliviere avenue.

Q. What grade crossing would be encountered in making that change?

A. There would be Kingsbury and Waterman avenue, and the Kingsbury would be eliminated by the Wabash plan and the Waterman grade or Waterman avenue would still cross the grade of the railroad track. Hamilton is the same as Kingsbury; they run together there; on one side of the track it is called Hamilton, north of the track, and south of the track it is called Kingsbury. It would be necessary to carry the project to about Olive Street road. That would not necessitate the elimination of any other grade crossings.

Q. You spoke of the difficulty that would be encountered on account of discontinuing the use of Olive Street road were it undertaken to carry out the City's project of putting the bridge over the tracks of Delmar avenue; in what manner would the traffic on Olive Street road be affected by that as to Delmar avenue, alone?

A. That would not be affected.

Q. Then your testimony respecting interference of traffic at Olive Street road would only exist in the event of the carrying out of the entire plan?

A. Yes, it wasn't exactly the interference of traffic at Olive Street road, it was the impracticability of doing the work as planned by the City on account of Olive Street road being there.

Q. You spoke of the exhibits of the City showing that the proposed cut along the right of way extended off beyond the temporary tracks?

A. That is what is between Union and De Baliviere avenue. I believe [fol. 435] lieve. I refer to City's Exhibit 33. I haven't it; I just got those distances off that map there. This temporary track, the way it is planned by the City, would cut right through the oil-filling stations. I examined Exhibit No. 90 to reach that conclusion.

Q. Exhibit No. 90 where it shows an interference on account of the oil stations?

A. No, but it locates that temporary operating track on top of the embankment and from map No. 33 it will be seen that that track is very close to the edge of De Baliviere and the oil-filling station on the west side of De Baliviere.

Exhibit No. 90: That garage was built or in process of building when that plan was submitted by the City. In the latter part of March, this year.

Q. You testified concerning another feature about the operating track—there is a garage on De Baliviere at Union avenue, north of the Wabash tracks?

A. This temporary operating track comes very close to that or else it will have to come inside of the limits of the cut proposed by the City. I don't know how they are going to get by there unless they take part of that building. I would consider that a very serious obstacle. A most serious objection from the fact that the operating track there would be very close to the cut; part of it in places overhangs the cut; that certainly would not be a safe or proper place to try to operate trains over. It would be impossible.

Q. You would consider that condition one which would make it impossible to adopt the City's plan?

A. It would make it ultimately impossible to adopt the City's [fol. 436] plan. That is, by following the plan outlined by the City in that Exhibit No. 90.

The obstruction on account of the Blackstone sewer was mentioned there in connection with the criticism of the City's plan or method of doing the construction work there. It is wrong and impracticable.

Q. Is that an obstacle that would render it impossible to depress the tracks?

A. No, but they would have to change their plan or method.

Q. It simply interferes with the method of doing the work?

A. Instead of starting the work at Union avenue, if they want to carry the drainage that way, the way they proposed to keep it out of the cut, they ought to stop at Delmar. It would not render it impossible to depress the tracks. I mean to say that the City's plan and method are wrong, and to do it will probably cost more money than the City has contemplated.

Q. Do you know what the cost of the different sections of this proposed improvement would be under the plan as contemplated by the Wabash Railroad?

A. No, I do not; I never figured that. I don't think the Wabash has ever submitted any plan in this case. I don't know whether they did direct to the City or not. They have a plan. I know in a general way how the total cost was arrived at. They were calculated in the Wabash office, partly under my supervision and partly under the supervision of Mr. Johnson of the Wabash.

The Wabash contemplated raising their tracks on an embankment from Grand drive clear to the city limits and beyond, but the [fol. 437] estimate was made only to the city limits, and I believe that is all you are interested in in this case; it contemplated carrying the Wabash tracks overhead and putting bridges over Lindell boulevard, Julien avenue, to De Baliviere, Waterman, Kingsbury or Hamilton avenue, Delmar and Olive Street road. At Delmar the intention was to raise the tracks in order to provide ample clearance for Delmar avenue, I think a clearance of sixteen feet or seventeen feet; that would contemplate raising the tracks sixteen or seventeen feet against their present elevation. Practically the same height at all those street intersections. It would not start at Grand drive; that would be nothing, but at the other intersections of the streets it would be about the same.

I said in my opinion there would be no consequential damages whatsoever to the abutting property resulting from the elevation of these tracks at the point where they crossed the streets I mentioned. We did not contemplate the payment of any consequential damages.

Q. Is the fact that the Wabash didn't contemplate the payment of anything for consequential damages, is that what you based your opinion on that there would be no consequential damages?

A. No, I don't think there would be, so long as they don't take any more property and get off the right of way, they won't damage any property directly. I mean I think there would be no damages to abutting property for which the party could have a legal remedy.

Q. If there were damages on account of not getting off the right of way, they couldn't be recovered?

A. Yes, sir.

[fol. 438] Q. Or raising the street grade?

A. Certainly in case of that kind there would be consequential damages, under the City plan, along Delmar, but not so under the Wabash plan.

Q. Is it your opinion that each piece of property that abuts the right of way is worth as much after the embankment is there as at present?

A. I tell you I think it would be worth as much money, but I don't think there would be any consequential damages. I don't think there would be any damages or remedy.

Q. You think the property would be worth as much?

A. Yes, in this particular instance.

Q. What experience have you had in appraising values in real estate?

A. I have been connected with railroad construction more or less for thirty-five or forty years, and I have had a great deal to do with the law of eminent domain and condemnation of property for rights of way etc., and that has been my experience.

Q. When controversies as to questions of damages arose, that was delegated to you or to a real estate expert by the company with whom you were employed?

A. I have often given my opinion. I don't claim to be an expert in real estate; I mean to say that I have a fairly good knowledge. In most cases of this kind the question of damages was referred to real estate experts. In some cases I have decided those damages myself, or had a great deal to do with deciding it. They very often paid damages on my estimate of amounts.

Q. What railroad companies did that?

A. Some years ago I was with a construction company and was [fol. 439] building some lines for the Frisco out in Kansas, and on a contract with the Frisco Railroad I went and settled a number of cases myself.

Q. That was where there was involved an actual taking of land?

A. Usually in railroad right-of-way cases they will figure the actual value of the land taken and the consequential damages to the remainder of the land. That was in districts in the country and also through thriving towns and little cities.

Q. In the rural districts the land was almost of a uniform value?

A. Yes, but we would probably go through some towns that had very high prices on the value of the property at that time, during the boom days of Kansas, in Arkansas City and Winfield.

Q. Where you made an embankment beside their property, did you ever succeed in making them believe they had not been damaged?

A. I didn't bother with them; if we didn't touch any of their land I never bothered with them at all.

Mr. Rodehaver:

Q. You testified that the smoke from the City plan would bother people much more than the smoke from the Wabash plan?

A. Yes, there would be more of it. I meant the adjacent property-holders. I don't think the City plan would increase the value of any property. I said the vibrations would be greater in a cut than they would be in a fill.

Q. It is a fact, isn't it, on filled ground the vibration is greater than on solid ground?

A. Yes, that is a fact in that particular case. That is "made" ground that the houses are on. The Wabash, if they fill in out there will have less vibration than they have at present, I think.

[fol. 440] Q. What will the Wabash be on if they raise their tracks?

A. Certainly that will be on a fill, but there won't be as much vibration on the Wabash on the raised track as on the depressed tracks, because it would throw the Wabash down below the natural surface of that low, swampy ground.

Q. If they got onto solid ground when they went down it would increase the vibration as against the filled ground?

A. Against the filled ground perhaps, yes; but not on the soft and marshy ground. The more they fill on the railroad embankment the less the vibration.

Q. You say if they depressed the tracks it would obstruct the view as against the raising of the tracks?

A. It would obstruct the view of the passengers; I mean that feature of it. I was very clear on that point, I think.

The raising of the railroad track would to a certain extent obstruct the view of propertyholders there. I don't think it would be as much as you anticipate. From Delmar to De Baliviere not near as much as you think it would, because the Wabash fill from De Baliviere to Delmar would not exceed 10 or 12 feet above present surface of the ground. It would not keep me from seeing my neighbor across the alley from the second story.

The noise is greater in a cut than it would be in a fill, and also it would be more noisy on account of the heavier grades in the City plan. All of those things affect the people in the immediate neighborhood.

Q. If it were shown that all the people in the immediate neighborhood [fol. 441] hood like all of that stuff, would you say that the City's plan was feasible?

A. I don't think they all like it. I question that 90 per cent do. I think they would be misled and not have the right information.

W. S. DAWLEY, being duly sworn, testified as follows:

Direct examination by Mr. Brown:

I am at the present time a consulting engineer. I reside in the City of St. Louis. My home has been there since about the first of January, 1907; four years of the time, however, I was in China.

I am engaged in the practice of my profession as consulting engineer when I can find something to do; that is not very often these days. I was connected with railroads directly for practically thirty-four years. For several years I was chief engineer for the Chicago & Eastern Illinois.

Q. Have you made any special study of questions of grade separation in cities other than this St. Louis question?

A. Yes; since my return from China I have been called upon by Mr. B. J. Arnold of Chicago; then at Flint, Michigan, and then at Baltimore, Maryland. I think Mr. Arnold, consulting engineer of Chicago, one of the best known there. In my association with Mr. Arnold I was employed in the capacity of representing municipal interests; in Chicago it was a certain bunch of people independent from both. In Baltimore it was for the City of Baltimore.

Q. While we are talking about that Baltimore scheme, tells us something about what the studies that were made there and what conditions [fol. 442] you had to deal with, and what the recommendations of yourself and Mr. Arnold were to take care of?

A. The City of Baltimore is located on ground that rises rather rapidly from the sea level, and the location of the Pennsylvania Railroad through there is accomplished by two tunnels on each side of the passenger station as located, the passenger station being near a stream down which the third branch of the Pennsylvania & Harrisburg came. The business of the Pennsylvania lines had gotten so heavy they were anxious to do something. They had been studying the problem for a long time, and finally asked the city for authority to build an additional tunnel parallel, or substantially parallel, to those already existing, still bringing all of their business, both freight and passenger, through this valley in the middle of the city where the passenger station is located. The Baltimore & Ohio runs through the city in a tunnel under a street north and south, and crosses the Pennsylvania lines a short distance west of their station, and turns to the east and runs into some very steep cuts, and gets out at the easterly edge of the city. The location is such that the Pennsylvania and the B. & O. are practically together for some four or five miles before they get to their passenger stations, and are substantially together for three miles after they pass through the city.

The city did not want to continue the operation of freight trains through this central portion of the city and past the passenger stations. They were, therefore, calling on various people to tell what could be done to remedy these matters. Various suggestions had been made, and various engineers employed. We examined all of [fol. 443] the schemes proposed, and studied one or two independent, and of our own. The final result was that we recommended the construction of about three miles of elevated structure along the immediate bay front, which was about 100 feet or better, immediately north of the docks, then through the residential district. This was to carry four tracks, upon which it was proposed that all freight business of both B. & O. and the Pennsylvania lines should be handled. This suggested elevation substantially crossed the City of Baltimore. A portion of it went through the business and a portion through the residential districts, crossing one corner of one part.

Q. Has that work ever been consummated?

A. Nothing has been done so far as I know. It was just at the beginning of the war in the summer of 1917, and I don't think the city and railroads have ever even agreed, so far as I know—that is, not a year ago.

Q. The result of the study begun by yourself and Mr. Arnold resulted in the recommendation of the treatment of the matter by the plan of elevation that you described?

A. Yes, sir.

Q. In connection with this St. Louis problem, have you made an examination at the request of the railroad companies of the surroundings and plans, etc., and have you reached any conclusions?

A. I have. My conclusions are all rather general, because I have not gone into the estimates or the details.

Q. Will you in your own way take up the matter and let us have the benefit of your judgment on the problem?

A. One of the most serious matters is the grade proposed. I [fol. 444] don't think any locating engineer would ever lay a grade as suggested by the City, if they could get away from it. They have introduced into the Wash track 70 feet of rise and fall while there need not be but a little over 20. We must forever drop every train down 48 feet and lift it up about 20 on trains going east, and the reverse figures going west, while if a grade line were drawn giving the proper clearance at Delmar avenue to the city limits to present elevation at Kingshighway, we would have the ideal grading of three-tenths of 1 per cent, and would pass over every street and give plenty of clearance so that the streets would not be necessarily disturbed at all.

Q. The fact of the street grades being undisturbed under the contemplated plan of the Wabash, is that in your judgment a very material advantage of that plan?

A. It is. It also has the advantage of the grading I have described.

While I have made no figures as to the cost, from my experience in other construction in the twenty years that I have located and helped build lines, I feel safe in saying the cost to depress the tracks must exceed the cost to elevate them, and materially so. It would seem to be a mistake for the City to insist that the railroads spend their money or the City spend their money in that way.

Q. Do you know of any compensation for that excess cost for the depression plan? Is there any compensating benefit?

A. Not that I can see; no, sir. That money in hand could be spent much better somewhere else—in eliminating dangerous crossings.

[fol. 445] To my mind the testimony of Mr. Currier as to the matters that made it undesirable to depress a track are all good. My judgment as an engineer almost perfectly and exactly coincides with the conclusions stated by Mr. Currier. There can't help but be additional expense in the maintenance of the tracks and the cut, and there certainly would be additional expense in lifting the loads out of the cut in the operation. There is a possibility and danger of obstructing signals by the smoke, but I don't think that is very great.

I regard the fact that this proposed railroad is to be laid about five feet below ground-water level as an important element in this case.

Objected to for the reason it assumes that there is testimony to that effect.

Commissioner Bean: Let him answer.

The Witness: I don't recall what the City's plan shows. On the profile that I have, which purports to show the City plan, the grade line is below the ground-water level. It was made in the Wabash office. It might be a serious matter and it might not, depending upon the character of the soil found when you get to the actual grade elevations.

My points are pretty well covered by saying in general that I agree with Mr. Currier.

Cross-examination by Mr. Senti:

Q. I understood from your testimony that in the City's plan we are introducing a 70-foot rise and fall in the tracks?

A. Yes, sir.

Q. Do you know what the existing rise and fall is at present on the Wabash tracks between those same points?

[fol. 446] A. I can tell you in a moment; I don't know. I did not take the present rise and fall into consideration when I made that statement. You propose to change the matter one way or the other. My statement was that you are here introducing the rise and fall of 70 feet.

Q. If, as a matter of fact, there is a considerable rise and fall there already, we are not introducing that much rise and fall?

A. Just that much over and above what would be necessary if a uniform grade line for the elevation sufficient to clear all street crossings properly at the city limits on the Wabash tracks. You are not introducing a rise and fall of 70 feet over what exists at present, something less than that.

Q. You say there was no compensating advantages from the adoption of the City's plan. You personally have made no studies of the relative values of real estate in the surrounding territory, have you?

A. I have not. I don't know that I took that into consideration when that statement was made. There would be no damages of anything collectible if the street grades are not interfered with in any way.

Q. I don't mean damages such as you might inflict on people's property for which they were fortunate enough to have a remedy, but an actual damage what the property is worth before and after?

A. No such thing exists. If I owned a home backing up on the Wabash right of way between De Baliviere and Delmar I would rather the tracks be raised than depressed. If I owned and lived in a house there I would say the same thing. It would be very much more objectionable to drop those trains down and work as [fol. 447] hard as they can to pull them out than to have them run up higher with no work at all.

Q. Could the Wabash plan as contemplated be put into effect so far as Delmar avenue alone is concerned without the elimination of crossings at other points?

A. It would almost necessitate something being done at Hamilton avenue, and if I am not very much mistaken, a less amount of money than the City proposes to spend at Delmar will eliminate both of those crossings at the Wabash.

Mr. Brown: Do I understand the City is raising an objection to the proposed elimination of the grade at Hamilton?

Mr. Haid: We want to find out what their idea is with reference to Delmar alone and if the elimination can be made without putting in force the whole plan.

The Witness: I can, yes, sir; it probably would include Hamilton avenue; as I said a moment ago, it would take less money to eliminate two grade crossings than to eliminate one under the City's plan.

Q. How much of a raise would that cause in the Wabash tracks?

A. That would cause a raise of about 20 feet up and 20 feet down in the Wabash tracks; 22 feet, or something like that. That would be in addition to the rise and fall they already have.

Mr. Brown:

Q. That condition there was merely a temporary condition and the plan would contemplate carrying the full segregation scheme into effect ultimately, and then you have your perfect grading, won't you?

A. Yes, it is only a temporary condition.

[fol. 448] Mr. Senti:

Q. Could the Wabash plan for the elimination of the grade crossing at Delmar be carried out without obstructing traffic on Delmar?

A. Yes, sir; absolutely, without obstruction of traffic; if necessary a bridge would be built high enough, starting at one end carried railroad traffic would continue where it is until it could be put above, across in such a way as not to interfere with any of the traffic. The

Adjourned until 10 a. m.

Mr. Rodehaver: Before we proceed this morning I would like to call the attention of the Commission that three of the witnesses yesterday referred to the Wabash plan. So far the records will show that no plan has been submitted by the Wabash Railroad. They refer to the costs of the City plan as compared with the Wabash plan. We have no figures whatever on the Wabash plan and without telling Mr. Brown how to proceed with his case, I would like some information as to what the Wabash proposes to do.

Mr. Brown: I assume, Mr. Rodehaver, before we get through with the case the Commission will want to have before it a plan that contemplates the elevation scheme of separation, inasmuch as the city has presented its plan for the depression scheme. We can't do this all at once; we have to approach it step by step. It is our purpose to present a plan which contemplates the separation of grades by elevation if and when it becomes necessary. I don't think we have reached the point in our case where that presentation of the plan and estimates of cost are essential to the hearing at this time.

[fol. 449] Mr. Rodehaver: I don't see how we can intelligently cross-examine their witnesses when they refer to the Wabash plan.

Mr. Brown: If any witnesses refer to the Wabash plan or to costs and you desire to cross-examine them, we will recall them for you after you hear our testimony. We don't want you to be deprived of any rights in that respect.

C. F. LOWETH, being duly sworn, testified as follows:

Cross-examination by Mr. Brown:

I reside in Chicago. I am chief engineer of the Chicago, Milwaukee & St. Paul Railroad. That railroad has within about a score of 11,000 miles. I have been engineer of that company about 11 years and previous to that for 10 years as engineer and superintendent of bridges and buildings and for 10 years previous to that consulting engineer of the bridge and building department of the Milwaukee Company.

I am a member of the National Conference on City Planning. Mr. Bartholomew, who testified in this case, is also a member of this Conference.

Q. Have you had occasion, as a member of this Conference and as chief engineer of the Milwaukee Company, to give special and detailed study to the question of both policies and methods relative to the separation of grade crossings in municipalities?

A. Yes, in the 20 or more years that I have been with the C. M. & St. P. Ry., I have had a very large amount of the responsibility [fol. 450] in deciding as to the plan and necessity of grade separation, of estimates and in many cases, the carrying out of the work.

That study has led me to study the policies and methods of grade separation in other cities. We have had demands at various places for extensive grade separation which have involved expenditures running up to many millions of dollars and in order that we might plan the work intelligently and economically and so that we might avail ourselves of the best practice throughout the country in such matters I have at various times looked into the practice and policy of grade separation throughout the east as well as the central west and in fact to the extreme west. Those studies and investigations have extended over a matter of 20 years or more.

As part of my investigation and study I have this question of grade separation on the Wabash and Rock Island in St. Louis. I looked into this first five years ago, when I was preparing for some litigation we had with the City of Minneapolis, and I had at that time a general knowledge of the controversy as it existed at that time; since then I recently obtained other information from the engineers of the Wabash and the Rock Island and from an examination of the ground. I made a personal investigation of this question on the ground.

My general observation leads me to the conclusion in recent years and perhaps extending back 10 or 15 years or longer, that by far the most important and extensive grade separations have been by carrying the streets under the tracks, sometimes by a partial depression of [fol. 451] the street and sometimes by leaving the street practically at its present level, but under what may be generally termed as the track elevation plan. In making that statement I am well aware that there are several rather extensive grade separations which have been made by a depression of the tracks and some that are pending, but notwithstanding those, for which there are reasons which controlled and justified those particular situations, yet the fact remains that the

present day practice and for some years past has been much more in the way of carrying the streets under the tracks and elevating the tracks, more or less, than by the reverse method.

Q. Have you had occasion to look into the special reasons that controlled where the depression plan has been adopted?

A. Yes, sir.

Q. Generally speaking, what were the special conditions and considerations which either induced or compelled a separation of grades by the depression method?

A. In those cases it has been where there was an elevation of ground and the gradient of the railroads were materially improved by depressing the tracks. In many cases the improvements that had been made that way are of a very similar character to what the railroad would make anywhere outside the city in cutting down grades. That is notably the case in the Belt Line through Buffalo, in which the grades were materially improved by depression of tracks through a section of the city, notwithstanding the fact that it was elevated on each side of this depression. The depression of the tracks which our Company made in Minneapolis, extending nearly two miles, was made quite willingly by the company, because we had at one end of [fol. 452] that depression a very large and important yard that could not be raised and the existing conditions involved a gradient that was very difficult to operate from that yard going westerly, almost a similar condition prevailed at the westerly end, so that we got a very decided improvement in our grade line and in our operating positions by making that depression.

Q. Was there any compulsion upon your Company to separate those grades by the depression plan, or was it merely a matter of practical railroad engineering?

A. It was a matter of practical railroad engineering. The City wanted the grades separated and we were more than anxious so to do it that way; in fact we could not have elevated our tracks at that point.

Q. On account of the grade conditions that you have described?

A. On account of the grade conditions that I have described and the very large increase of cost that would have been involved in raising the yards at either end so that we would have had a grade line which we could have operated over at all. Speaking generally, that is the condition that has existed in some form or other wherever the separation has been made by depression methods, so far as my investigation shows.

Q. Throughout your investigation have you ever found any place in any city where the sole or primary consideration for depression plan has been the aesthetic notion of the view or design of the structures?

A. I don't recall any now; no, sir.

Q. In your investigation have you formed any judgments about the relative advantages of the elevation method as opposed to the depression method of grade separation?

A. Yes, I have. The advantages of elevation over depression speaking generally, are a great many and they are very important.

The disadvantages of depression are very decided and are frequently such as to make operating conditions well nigh impracticable.

In the depression of a piece of main track of a railroad with frequent overhead structures carrying streets, there is introduced an element of danger into the operation of the railroad by the overhead structures which are evident by the overhead structures which come about through the need of supports between the tracks. These supports between the tracks restrict the clearance; they are obstructions which frequently result in injury to employees; they are of a nature of obstructions which the railroad would ordinarily spend a great deal of money to avoid.

There is also evident from those overhead structures a limited clearance which makes operating conditions more difficult and oftentimes very dangerous. Men have to ride on top of freight cars and any overhead structure, unless it is at a height that will permit a man to stand on any car, is an element of danger.

The height of a freight car varies; it may run from 10 feet to a maximum of about 14 feet above the rail.

These overhead structures are not only sources of danger to trainmen, but they interfere materially with signaling in two ways. First they make it impossible to locate signals at proper location. A signal should be located with reference to the element of the railroad that it is protecting and the practice requires it to be located within those danger points. With narrow margins with overhead structures it is [fol. 454] impossible to locate the signals so that the railroad can be operated economically and advantageously. That is true if you have the full clearance that railroads ordinarily ask for, 23 feet; whatever clearance you have less than that, very much accentuates that difficulty.

The smoke that settles under these overhead bridges also obstructs or obscures signals. Particularly is that true on a double or multiple track railroad, because one train may be moving in a direction on one track and block the subway with smoke at just the time when another train is coming from an opposite direction on another track, and it is a fact that the difficulty of maintaining signals so they will be seen is materially affected.

Danger of the majority of trainmen is very much increased, especially over overhead bridges that come with considerable frequency. We have had in our depression at Minneapolis a number of accidents. We had one case in which the passenger train ran into an open switch because the signal could not be seen and the signal was obscured by bridge supports.

Q. Obscured by the smoke in the cut?

A. By the view of the bridge support and the smoke in the cut, that condition exists notwithstanding the fact that it had been anticipated and all the measures that we could think of had been taken to guard against it; accidents and fatal accidents have occurred.

Q. Suppose there was an interlocking plant to be operated in a cut where two railroads connect with each other; what would you say of that situation in a depression and at a point where principal streets cross?

A. It would be a condition which would bring about elements of serious danger in operation and it would complicate the operation [fol. 455] and make it more difficult and slow up the movement of trains and, under some conditions of weather, it would do so to a serious extent.

Q. Would there be serious danger in the operation due to inability to observe signals on these days of heavy atmospheric conditions?

A. Yes, there would be the difficulty because in the first place you couldn't place these signals for that connection or interlocking at proper location. It would be affected by overhead bridges and it couldn't be seen from as long a distance by an engineer approaching it and under certain conditions of smoke even in the best of weather and certainly in some conditions of weather the signals would be obscure.

Some of the difficulties in the depression plan are the very much longer period of construction which is required of any plan of depressing the tracks which involves a torn-up condition for both the streets and the railroad for a much longer period. It is much more difficult to properly police a depression of tracks than an elevation.

There were cited in recent litigation instances where holdups have occurred and the criminals have gotten away by going over the side of a viaduct and dropping down onto freight cars and getting away. That would be impossible in an elevation. In some places that is considered a very serious matter.

In a depression of tracks naturally the tracks are at a very much lower level and so low a level in most cases that the difficulties from drainage are very great and sometimes even with the best provision for taking care of it, there results a wet roadbed which not only makes it impossible to maintain a good track, but it adds very largely [fol. 456] to the increased cost.

Q. Has that been your experience where you had depressed tracks?

A. It was not our experience to any serious degree in Minneapolis because we cut through a sandy ridge, but it has been true in some other places where we have depressed tracks. It certainly would be true where depression was below ground water level. Depressed tracks are very much more difficult to maintain in a clean and sanitary condition. The noise from passing trains is accentuated in cuts and depressions, especially in places where there are walls on each side of the depression.

Other objections to the noise is not only that to people living there adjoining the tracks, but the noise is very unpleasant to passengers and also make it difficult sometimes to properly operate in a way of giving signals.

The smoke is a nuisance not only in the way I have described, but also objectionable to passengers. Smoke blown against an overhead bridge rebounds and comes down, and in the summertime, when windows are open, it floods passenger cars, and even in winter it sometimes comes through vent-holes and makes a condition intolerable in some cases. That is especially true where there are a succession of such overhead structures.

Another very serious objection to track depression, as compared to elevation, is increased cost. So far as my observation goes, it could be generally stated that a depression of tracks as compared with an elevation for purpose of grade separation would cost from two to three times as much, possibly even more than three times as much.

[fol. 457] Q. What do you say about the smoke nuisance on residences adjacent to the cut between these highway bridges?

A. If conditions as to gradient are the same, so that the locomotive would be making no more smoke in a depression than it would on an elevation or on present surface of track, there is no question but that the smoke would be more objectionable to the surrounding country or city blocks in a depression than it would be in an elevation, or than it would be even with the tracks remaining on the surface.

Q. Why is that so?

A. It seems to me self-evident. A locomotive emits smoke at a level of more or less fifteen feet above the surface of the track. That quantity of smoke emitted in a street in a residence district at fifteen feet above the surface of the street would be disseminated and largely pass over the houses. Even if the wind was blowing strongly and the smoke didn't rise, but floated along at a level, it would be at a level of about fifteen feet above the surface of the street. What happens if you put that down on the ground? That smoke is coming out at street level and is drifting along at level of the street and comes in the way of every sign-board or building it meets; that further disseminates the smoke and it makes a very bad condition.

I think it is self-evident that no industries making smoke would be allowed to emit smoke at the surface of the ground or even at fifteen feet above the surface; it would be more practical to build higher chimneys.

In case of track depression, as compared to track elevation, we may assume the difference in level would be thirty to forty feet, depending upon conditions. In the case of elevation the smoke [fol. 458] would be emitted from the stack at that much higher level above the surrounding country. If the gradients are such as to call for greater exertion on the part of the locomotive in order to overcome these gradients to that extent, there is a larger volume of coal burned to furnish power and a larger volume of smoke, and that makes another increase in the conditions which would be objectionable from smoke.

Q. Suppose the train is required to stop in this depression and on the gradients, and then to start again up level or grade, a loaded train, either passenger or freight, what will happen?

A. That means an increased volume of smoke over what there would ordinarily be because of the starting of the train; there would not only be the objectionableness of greater volume of smoke, but greater volume of noise. In the puffing of the engine the exhaust would be very much accentuated and of a character to be a nuisance.

There is added danger of wet tracks in a depression. With a wet

track there is the liability of the drivers slipping, which results in a larger volume of smoke and a much larger volume of noise.

Q. Have you observed the effect of this smoke on the street from the standpoint of a traveler on the viaduct?

A. Yes, sir; it is frequently objectionable, depending on which way the wind is blowing. The smoke oftentimes is blown across the top of the bridge and it is unpleasant to persons because of the obnoxious gas and it obscures the view, and there have been accidents that have occurred to vehicles because of that smoke.

Q. At Delmar avenue, the City proposes to construct a viaduct [fol. 459] over the Wabash tracks having a width of 100 feet with a clearance of eighteen feet. What, in your judgment, will be the effect of the smoke to travelers on that highway, and I may say a double-track street car line will be on that viaduct; the City's testimony has shown about 7,000 vehicles pass that point every day, to say nothing of the thousands of pedestrians. I think that about 30,000 people in street cars pass over that viaduct at present, to say nothing of the increase in traffic in the future. What will be the effect upon the highway travelers on that viaduct?

A. I think there would be an appreciable portion of these travelers that would be inconvenienced and annoyed by smoke, and to some extent would be endangered as to the safety of their own travel over the viaduct. The smoke would be intensified at that particular place because of the very low clearance, the very great width of the street making a long subway something over 100 feet.

Q. It must be true, when the engine goes under that bridge along the railroad 100 feet in length that it exhausts against the roof or the under side of the viaduct, that the smoke must spread out from one side of the bridge or the other, and then it will naturally rise and go over the street part of the viaduct, will it? That is, the paved portion?

A. Yes. If that bridge was comparatively narrow, twenty or thirty feet, there would be much less smoke; it would be held under. But here is a viaduct over 100 feet in length. It is so low and the sides so close together that there is no room for a desultation of the smoke in the subway itself, and it comes out not at many places, but comes largely at the end, and under certain conditions of the wind it will [fol. 460] drift back over the structures. I have observed that thousands of times in thousands of places.

Q. Whenever you lengthen the street bridge over a depression do you not increase these dangers on the highway that you speak of?

A. You do. Not only them, but to travelers on trains and employees of railroads, and the operation conditions are increased and made more difficult, with the result that operating is more expensive and less certain.

I haven't made any observations in recent years to determine whether the vibration from the operation of the train is greater in a depression than on an elevated embankment, but I know that that must be the case, because of a recent matter that has come to our attention in which our company was more or less directly interested. The tracks of the Northern Pacific at Minneapolis run through what

is now property belonging to the University of Minnesota. The University contended for a good many years that the operation of trains of the Northern Pacific interfered seriously with its laboratory work and tried in many ways to get the railroad removed, and steps have been recently taken which will probably result in the abandonment of the Northern Pacific Railroad at that point and its construction to one side of the university.

I know of this case because the change that had to be made involved certain changes in our tracks and connections with the Northern Pacific, and so there was a conference called of the regents of the university and the city authorities of Minneapolis and the three or four interested railroads.

As a result of that conference plans were worked out, the regents [fol. 461] of the university went to the Legislature and procured an appropriation of about \$800,000, with which to pay the expense of shifting the tracks.

These tracks that are to be abandoned by the Northern Pacific were built originally in a cut for the greater part of this distance and several streets were carried over these tracks; it is a double-track railway, and there was no switching in the immediate vicinity of these tracks.

Mr. Haid:

Q. At what distance from the track at that time?

A. As I remember, some of the buildings were within a block of the track; now they have built on both sides of the track.

Mr. Brown:

Q. What will be the effect on residences, flats, etc., erected on this filled ground from vibration due to operation of the railroad in a cut and on an eight-tenths of one per cent grade?

A. I think that vibration from a railroad train ordinarily is not observed by the average person going about his daily vocation. I have, though, for a number of years, made it a point to more or less observe those things because I have been in an office where I could definitely locate the tremor due to a passing train. I feel confident for those people that would be sensitive to a thing of that kind, there would be very much increased probability of it being objectionable more in a depression than in an elevation.

Q. Something has been said here that under a depression plan in the City, especially where the railroad right of way is restricted, the carrying out of the depression plan restricts the use of the railroad's right of way for future development. Have you made observations on that question?

A. Yes, that is a very important question. It is possible by elevation [fol. 462] of tracks for a railroad to develop for traffic purposes the entire width of its right of way, but with a depression of tracks it is not possible, because the sides of the depression must either be retained by slopes or by retaining walls, and those slopes or retaining walls must be upon the right of way, and

to the extent that they are on the right of way they reduce the right of way that could be used for railroad tracks.

Q. It is not true that where you have solid retaining walls it is necessary to have horizontal clearances between the inner face of the walls and the locomotive or car?

A. Yes; fully as much as with an elevation, and probably more.

On an elevated structure you can build your track just as close to your right-of-way line as you could do if the track was laid on the surface of the ground.

It is considered good railroad engineering to build an outside track on the elevated structures as I have described.

Under the depression scheme I should say three tracks is the maximum track capacity of that right of way; under an elevated plan, four tracks would be the track capacity.

Q. It is in evidence that at present there are only two main tracks located on this fifty-six foot right of way. Would you consider it good railroading or good economics from the City or railroad standpoint or from the standpoint of the public to adopt a plan that will forever restrict the expansion of that railroad to a three-track railroad?

A. It certainly would not. My reasons for this conclusion are that this particular situation is in one of the very large cities in the United States and is rapidly growing. It is located with a country [fol. 463] surrounding it of vast possibilities. The railroads in question, both Rock Island and Wabash, extend for many miles through this western and northwestern and southwestern country. No one can tell about the development of the City of St. Louis and what it will be. It is certain no other railroad can ever come in in the future from the west and seek a new and independent entrance into St. Louis. It is inconceivable that that should come about. If this future development is to be taken care of for the city and country west of St. Louis, it must be in a measure through the railroad that now exists, and it seems to me to be very foolish to adopt a plan which would limit or curtail the development of railroad facilities so they might keep pace with the demands of the country and city.

It is also possible that other railroads may be obliged to come in over these same tracks.

Q. It is in evidence in one of the exhibits in this case that there is an agreement with the City of St. Louis and the Wabash and Rock Island whereby those railroads must admit other railroads to use those tracks through Forest Park should they ever desire to enter. I was calling your attention to the growth of the City of St. Louis and what may reasonably be expected in the future.

A. Can I add a word to the importance of this particular piece of railroad? In view of the Transportation Act recently passed, the Interest Commerce Commission has recently issued a report in which it suggests the possibility of bringing the Chicago & Northwestern and Union Pacific into St. Louis over the Wabash tracks; whether they will use these particular tracks or others of the Wabash, [fol. 464] if this plan is carried out, there still remains a question, but it is certain that if anything of that kind is done, all of the exist-

ing trackage will be required and some of it will have to be largely added to: this being one of the direct lines from the heart of the city, much more direct than many other lines, it would certainly be one that, other things being equal, would be chosen to form a main artery.

Q. Isn't it fair to say that, looking even into the near future, there is every indication for a necessity of expansion of the railroad plan, rather than a restriction of it?

A. Absolutely so, and I know that our company has been spending large sums of money in order that we might conserve and obtain the possibilities of unrestricted use of our terminals, that is, in our larger cities.

I think it is quite probable that within a reasonable future a large suburban traffic may be required over this section of the railroad. When that time comes it will require an expansion, and an adequate expansion could undoubtedly not be made on a three or even four-track railroad.

Q. In your study of the elevation scheme in the various cities, have you observed the treatment where railroads are located in public parks or near or adjacent to public parks?

A. Yes. There was introduced in evidence, I think yesterday, the situation as to Cleveland, in which there is an elevation of tracks through some important parks. The railroads of Philadelphia pass through Fairmount Park and in the proximity of other parks; in most cases they are above the general level of the park. The park drives pass under the railroads. There are a large number of very [fol. 465] interesting and satisfactory examples of that, and reports from Philadelphia have a great many references to the satisfactory treatment which has been given from an aesthetic point of view to structures which carry the street under the railroad tracks.

Q. Haven't there been some recent studies or plans made for grade separations in the City of Philadelphia?

A. One of the most extensive schemes for grade separation that has ever been brought about has recently been brought about in Philadelphia in what is known as South Philadelphia which will result in the elevation of all the railroads in South Philadelphia except at a few places, and where the grades will be separated in that project they will be separated in every case by carrying the railroads over the streets with the exception of one street. I can't say definitely how many of those grade separations there will be, but not far from forty or fifty; in every case there will be an elevation of tracks over streets except one.

Q. Where is this line of railroad with reference to the city itself; on the outskirts, or does it run through?

A. It skirts along the Delaware River a few blocks, and a few blocks from the river west there are branches extending out to the docks, and generally that portion of the railroad is not to be elevated. It crosses the city directly from the Delaware River to the Schuylkill River in an easterly and westerly direction, and through an old and populous, well-built section of the city; that is to be entirely elevated.

Speaking generally, the railroad runs some distance away from [fol. 466] the Schuylkill River, but a few blocks easterly from it in a southerly and southeastern direction toward the League Island Navy Yard. That project was estimated to cost before the war and pre-war basis of prices, about \$21,000,000. The work has been begun in some parts, some under way and other has been completed; my last information was that as soon as financial conditions were such that both city and railways could proceed, they would proceed.

Q. You heard Mr. Dawley's testimony yesterday in regard to some bridge elevation projects in Baltimore. Are you familiar with that?

A. Yes; I was in Baltimore last spring and in conference with the city authorities and engineers of the several railroads. I learned that the project for that four-track elevated railroad in the vicinity extending across the business portion of the city and residence portion of the city was a live matter, and I have with me a copy of a letter which the Mayor addressed to the presidents of the three railroads in Baltimore asking for a conference on several matters, and one of which was this four-track elevated railroad.

Q. So that project is a live one?

A. It is very much alive.

Q. You heard Mr. Currier's and Mr. Richards' testimony in regard to grade separation projects in Cleveland, did you not?

A. Yes, sir.

Q. Are you personally familiar with that situation?

A. In a large measure, yes.

This is a lithograph map of the City of Cleveland dated 1913, and it bears a legend in ink showing the tracks over the streets as completed; also proposed subways and viaducts. Then in pencil is [fol. 467] added to that some figures showing the situation as corrected to July of this year. It indicates there are eighty-two subways built, seven subways proposed and fifty-one viaducts built as proposed.

Q. You refer to subways; you mean where the railroad is carried over the street?

A. Yes, sir. The map is marked correct to July, 1921. It may possibly be subject to slight corrections because we are in the process at this time at my office of gathering data for an extensive grade separation project we are giving consideration to, and this data has not been fully digested and put in form, and I notice there is one very important subway in a park which is not indicated on this map; I presume there may be others. That is the one in Gordon Park carrying the main line of the New York Central Railroad. The subway I speak of has been constructed.

Wabash Exhibit No. 21 marked.

Q. On your map upon the wall there is a profile map showing the profile of the situation covered by this grade separation controversy and showing the territory, and behind you is the large plastic model of Forest Park which the City has prepared, and I believe is an exhibit in this case, showing proposed treatment under City plan in Forest Park. Referring to this profile map which we will later in-

roduce in evidence I call your attention to the fact that the line there indicated as the ground-water level, and that map also shows the line of the base of the rail, if the construction is carried out under the City's plan, and also shows the line of the base of the rail, or if the project is carried out under the elevation plan, have you [fol. 468] any comments to make, first upon the question of the dangers or evils due to the fact that under the City plan the tracks will be constructed approximately five feet below ground-water level?

A. That plan shows that the base of rail by the City plan would be below level of ground water for about 4,000 feet. Five feet will be the maximum.

Q. What are the troubles about that situation?

A. The trouble about that is that under a situation of that kind a roadbed is much less stable and the track would be very much more difficult to maintain in a fair degree of condition, and it would be impossible to maintain for any considerable period of time; the track conditions which would be equal to those which would ordinarily exist at the surface of the ground. It might be done for a day or two at a time, but the track conditions would never remain. It is desirable and proper to have this for more than a few days at a time. That condition is bad railroad engineering, something that is universally avoided wherever it is possible to do it.

Q. By that I understand the only justification for a condition of that kind would be a case of absolute necessity?

A. Yes, sir.

Q. You will observe that on the map that going westward on proposed City plan the grade of the railroad will be eight-tenths of 1 per cent to a point beyond the city limits. Having in mind that a passenger station is located on the Wabash Railroad at Delmar avenue, and that that line is used for heavy passenger trains and heavy switching of freight trains at present, would you regard that condition as being good or bad railroad engineering?

A. I would regard that as being bad railroad engineering, especially a condition of that kind which is in such close proximity [fol. 469] to a connection with another railroad such as exists near De Baliviere avenue, or where the Rock Island connects.

Q. Speaking of the Rock Island connection with the Wabash, or crosses it, rather, it crosses the Wabash Railroad at De Baliviere avenue, and I believe the City's plan introduced in evidence for the Rock Island shows that for the line of the Rock Island going westward from De Baliviere avenue there is a grade of 1.13. It is also shown in evidence that the Rock Island has a passenger station at De Baliviere avenue, and speaking with respect to the Rock Island, would you regard that good or bad railroad engineering?

A. I think it would be extremely bad.

Q. Would either condition, in your judgment, ever be justified from a railroad engineering standpoint, except in absolute necessity?

A. No, even if they should be provided for under conditions of absolute necessity, they would never be satisfactory or safe.

Q. You will observe that the location of the Rock Island station is right there at that point where the track is below the ground-water level at the greatest distance; is that an important element?

A. That is an important element. It would make the drainage of a roadbed more difficult because of the station platform that would be involved, which always makes track drainage more difficult, and then the track would not be in first-class condition; there would be many more times when the track would be wet, so that in starting a train the difficulties would be increased.

I have had no experience in the operating department of the railroad, but we can't design engineering structures and build [fol. 470] railroads without knowing the conditions under which they must be operated. It is the first requisite for proper railroad engineering.

Q. That interlocking plant that protects the crossing of the Rock Island with the Wabash tracks located at De Baliviere avenue, which is the deepest point of the cut, is it good or bad railroad engineering to have that condition down in a ditch like that?

A. It certainly is not.

Q. Isn't it true that all of these conditions to which you have called attention not only increase the cost of the original construction, but do they not place a perpetual burden upon the railroad and upon the public in the matter of maintenance and the carrying of dead investments?

A. Yes, sir; in the matter of a maintenance and dead investments and in other charges such as increased cost of signaling, guarding the tracks and operating of trains.

Q. That isn't a temporary condition, is it? Whenever that project is put through, it is a perpetual condition and a perpetual burden that is cast upon the railroads and the public, isn't it?

A. That is right.

Q. Refer to that plastic model of the City—I call your attention to the fact that the City proposes by some method still unexplained to take the present railroad of the Wabash and Rock Island through Forest Park and present them with another one over on a location selected by the City, to which you will see in the ditch laid out in that plastic model. That railroad project begins up there at Kingshighway and runs cat-a-cornered along until it gets to the crossing of Lindell and Union avenues. For a considerable portion [fol. 471] of that distance the City proposes to put the railroad in a cut and as indicated by the model, they propose to throw up an embankment on each side of that cut or ditch. Do you consider that as good or bad railroading? First, I will direct your attention to the gradient there, I think going east, toward the upper left-hand corner of that railroad as proposed, there is a grade of eight-tenths of one per cent going into Union Depot; trains going in there have got to make that climb in the park. That is a compensated grade?

A. That would involve about 800 feet of 8/10 per cent grade, is that right?

Q. Yes.

A. That is right. About 4,000 feet. That profile shows it .35% grade from Union for about 3,000 feet and then a .65% grade for about 1,000 feet and then 8/10 grade for about 3,000 feet.

Q. You say that is a compensated grade and you have to go to the top of the hill across to Kingshighway?

A. You have to add another 2,000 feet or more of ruling gradient.

Q. Taking that grade as shown on that plan, do you regard that as good or bad railroading from a voluntary construction standpoint?

A. I can't conceive that in a situation such as that is, that any railroad would go into that except as a matter of extreme necessity and as a last resort. It certainly would forever limit the capacity of the railroad in its traffic movements.

Q. The City proposes to build two embankments, one on each side of this cut; it has been testified to in this case on behalf of the City that one of the objections to the railroad in the park is that it is on an embankment. Are you impressed with the fact that [fol. 472] an embankment is any different on present location than it would be at the location shown by City's plan? Would there be any more difficulty for the proper treatment of the embankment in its present location than where it is located by the City?

A. I don't see any objection to the City putting an embankment on either side of the depressed tracks. I presume the treatment of those banks would be in a general way the same as would be the treatment of the railroad embankment if it was left or a new one substituted.

Q. The problem of treating embankments will be just as great when the City builds those two embankments as it is now where the railroad has its single embankment, will it not?

A. I should think so.

Q. You have had considerable experience, have you not, in the construction of projects of this magnitude and greater?

A. Yes, sir.

Q. What, in your judgment, would be the time required to carry out this project on the plan and by method proposed by the city? Have you looked into that question sufficiently to state your opinion?

A. Not in detail, Mr. Brown. My opinion, based on rather general information, is that it could not be done reasonably in two years, but could readily be done in three years.

Taking the Delmar avenue and separating it from the plan of which it is a part, the construction of that viaduct by the City plan would certainly consume a full season. I think it could be completed in a season.

Q. You have stated numerous objections to the City plan. On that map there by the red line is shown the base of the rail of the [fol. 473] Wabash Railroad under the proposed plan of the Wabash, to accomplish a separation when required by the elevation method. Is there any practical engineering difficulties of carrying out that elevation project?

A. I see none whatever.

Q. Looking at that grade line shown in red on that profile, I will ask you to state if that is not, in your judgment, a very excellent grade on which to carry on the railroad operation?

A. That would be a very desirable grade line. It would meet all reasonable requirements for future growth of traffic and would minimize all objectionable features of railroad operation in the city, especially in a park or residential district.

Q. I think it is conceded by the City that if a viaduct is constructed at Delmar according to City's viaduct plan it irrevocably fixes and determines the further question that any future grade separation south of Delmar avenue must be by the depression method, according to plan proposed here by the City. In your judgment, is there any justification that you know of that that plan should be irrevocably fixed upon the railroad company or the City or the public by the construction of that viaduct at Delmar avenue?

A. No; it would seem unwise to do that.

Q. In your experience with elevation projects and grade separation and your investigation in cities of the United States where that work has been carried on, have you observed or encountered any difficulty of taking care of street bridges in an elevation plan in a manner satisfactory to everybody? I mean in making the bridge so [fol. 474] it doesn't present an eye-sore to the residences near or people using the streets?

A. I find a number of cases in which there are bridges which are objectionable. They are so from a standpoint of unsightliness and from standpoint of arrangement and interference with traffic in the street. But, as a rule, those are the older constructions and so far as my observation and experience goes, I know of no reason why bridges for track elevation over streets cannot be made to answer all reasonable and proper requirements on the part of the municipality and the public using the streets and residents living in the vicinity of such structures.

Q. There are no construction or engineering difficulties about making a bridge across the street in an elevation plan either simple or ornate, to the degrees desired, is there?

A. None whatever. There are a variety of plans as to character of such bridges and so far as the track elevation is concerned there is no reason why the bridge cannot be made to satisfy the requirements of the majority. They can be made ornate or simple, large or small.

Q. There has been a great amount of talk about a "Chinese Wall" that the railroad wants to build around a city. What do you think of that sort of situation?

A. I never could understand why a track elevation was called a "Chinese Wall." It is nothing of the kind. I can understand reference to a Chinese wall to some grade separations which involve very material changes in the grades of streets, especially where the grade of the street is raised.

Q. Like Delmar avenue?

A. Yes. I don't think offhand I could cite a more clear-cut evidence of what a Chinese wall will be than Delmar avenue, change if made according to the City's plan.

Q. There is vacant property on the north and south of Delmar avenue, east and west of the railroad, as you have observed. The

City proposes to build an embankment there twenty-two or twenty-three feet high immediately adjacent to that vacant property. What has been your experience or observation as to the effect of that kind of structure put up in front of vacant property?

A. My observation is that more frequently than otherwise the property that is in the location that will have this project, if it is carried out as you state, remains unimproved. I know a number of places where damages have been paid for change of street grade, and they have in some cases approximated the full value of the property, and yet the character of the property has not been changed or improved. I think the probabilities are that that property will not improve for a long time if that earth embankment is thrown up in front of it.

Mr. Hall:

Q. Speaking of the effect of this elevation of Delmar boulevard across the tracks we have prepared here a photograph taken in Delmar boulevard just west of Rosedale avenue, and looking east with some red lines drawn across the photograph at the elevation of the viaduct over the Wabash tracks and also another photograph showing a side view of Delmar boulevard taken from a point north of Delmar and west of River des Peres and east of Rosedale, with lines drawn parallel with Delmar boulevard in red ink showing the elevation, the comparative elevation. Do those photographs illustrate what you have in mind when you speak of that viaduct constituting a "Chinese Wall" in Delmar boulevard?

A. Yes; the first photograph you mention, the one which is taken looking along the street shows a street in which the grade of the street is closely a level grade extending for a long distance either way from the tracks. I understand that the plan of the City involves raising the grade at the tracks for a matter of twenty-two feet or so. Such an elevation in this street will have the effect of shutting off the view of the street looking in either direction from a point near the foot or some distance away from the foot of the incline which it is proposed to put in. In this particular view after the street grade is changed, a person standing at the westerly or southerly end of the incline would not only be unable to see the street beyond the railroad track, but would not be able to see the top of the three-story building that now exists on the right-hand side of the street, and could only see the top of the theater on the left-hand side of the street.

I don't remember the names of the streets. The effect of that is like this: Here is a broad thoroughfare, pretty near level, and standing anywhere on it you can see for a mile or perhaps a greater distance, along the street, and it is proposed to put an earth embankment twenty-two feet in height, which will effectually shut off any view along that street. No method of track elevation that I know of would accomplish anything that would approximate as serious a situation as that would be.

I don't think this other photograph illustrates the point nearly as [fol. 477] well. It does show where the new grade line will be with

reference to the building that exists on the far side of the street. It shows practically the same effect that you would have approaching the Delmar viaduct from a street leading north from it.

Wabash Exhibits Nos. 22 and 23 marked and filed.

Adjourned until 1.30 p. m.

C. F. LOWETH resumes.

Cross-examination continued by Mr. Senti:

I am connected with the C., M. & St. P. Railway. I had some connection with the elimination of grade crossings for them. I don't recall how many grade crossings I took part in the elimination of; several hundred, possibly 500.

Q. They were largely in the vicinity of large centers of population, were they not?

A. No; they were in cities and in the country. A great many of them have been in cities. The modern tendency is toward the elimination of grade crossings where there is need of them shown.

Q. What factors do you usually give consideration to in determining whether or not a need of the elimination of grade crossings is shown?

A. Without attempting to mention them in their order, just as they come to me, there would be the history of the crossing, the number of houses, the question of whether the traffic on the street was delayed materially and whether there was a danger of accident. The danger of accidents is quite an important factor in determining the necessity of elimination of the crossing.

[fol. 478] I have not made a study of the situation at Delmar with respect to the need of a grade separation.

I heard Mr. Brown make the statement that the evidence showed there were about 7,000 vehicles passing at this point daily, and that this was in addition to the daily street car and pedestrian traffic at that point.

Q. If the traffic should show that the street cars passing that point were about 1,300 daily, would you say that a necessity existed for the elimination of the grade crossing at Delmar avenue?

A. I would say those statistical figures would indicate the possibility, in fact, even the probability, that the grades ought to be separated, but those figures would have to be considered in relation to the history of that particular crossing. If it could be shown that a danger did not exist, the fact would have to be considered along with the statistics of the traffic.

Q. The probability would be that the conditions there were of a dangerous character, if it were shown that that much traffic crossed over the railroad tracks on which about fifteen passenger trains ran every day, would it not?

A. The probability of anything of that kind must in a large measure be gauged by what the record of the past has been.

Q. You think the probability of an accident occurring would depend upon whether a previous accident had occurred?

A. I think that would have a great deal to do with it.

Q. The fact that people had not been killed at that point would be evidence of the fact that no matter how great the traffic were, there would be no probability of people being killed there?

[fol. 479] A. I didn't state that, and I didn't intend to be so understood. I said statistics as to the traffic would have to be considered in connection with what the history had been.

Q. Do you mean how many people had been killed in the past?

A. Yes, and how many injured.

Q. The amount of traffic over a given point at a grade crossing would not have any weight at all unless there had been previous accidents?

A. That is an unjustified conclusion from my statement. It may be there would be crossings in which the grades ought to be separated where the traffic was a great deal less than in that case. It is a measure of cost, too, of the cost of separating a grade at one particular crossing, though the traffic may be great, so much greater as to make it unwise to separate that crossing, whereas at some other crossing where the cost of the work could be done for much less, although the traffic danger is less, there would be a justification for separating the grade at that crossing. If that reasoning don't apply, what follows? Simply there are no grade separations at all except in cities.

Q. You don't reach the conclusion that in some cases it might be better policy to go ahead and kill or maim people and pay damages than to go ahead and eliminate the danger?

A. No; not at all. I don't think that would be the logical conclusion a person would arrive at on that theory. I said the fact that traffic was as heavy as the evidence here indicated would create a very strong probability of the necessity of eliminating that grade crossing.

I said the improvement of the railroad grade was a very material factor in determining the necessity.

[fol. 480] Q. In arriving at your conclusion as to the necessity of elimination of grade crossing at a given point, what other factors do you give consideration? To the amount of traffic and changes of the physical grade of the railroad, the percentage of grade. What other factors in addition to those two?

A. In the matter of grade separation, speaking generally, a great many factors have to be given consideration; the question of grades and other operating conditions of the railroad; the question of the grades and use of the street or highway by the public; the question of permanency and cost of maintenance; the question of mutual convenience to both parties so that the solution best meets with all the requirements of the situation. If we must name specific conditions, we ought to have a specific case.

Q. Say in the case of Delmar avenue; what specific conditions would you take into consideration?

A. I think we would take into consideration the extent and amount

and character of the traffic on the street; the grade of the street each way from the crossing; the character of the street generally each way from the crossing; the conditions that are necessitated by making any change in the railroad, the disturbance of the railroad; change in its grades; the disarrangement for the time being of its traffic and the difficulties that would be encountered in maintaining properly and economically such structures as would be involved by making a grade separation at that point.

Q. In your consideration of Delmar avenue project, there are no insurmountable obstacles to the depression of the tracks, are there?

A. Yes, sir; there are impractical considerations.

[fol. 481] Q. State whether or not there are insurmountable obstacles to be encountered in the depression of the tracks?

A. Yes, sir; but to the extent of not being able to depress the tracks; no, sir, there are none. It would be possible to carry out the depression so far as the mere doing of the work is concerned.

Q. You made references to the danger that is incident to employes riding on top of cars where there are overhead bridges. Would that apply to residential districts as much or more than it would to an industrial district?

A. It would apply to any piece of railroad over which freight cars are necessarily operated.

Q. Would the character of adjacent territory have any effect upon the probability of employes being on top of freight cars?

A. No; I don't think it would except this: Around industries and in yards where there is a good deal of switching, more of the signaling that is done is perhaps done from the ground than from top of cars, but away from industries of that kind where trains are in motion there is no way except for the man at the rear of the train or on the cars to signal.

It is customary in the proximity of stations and crossings and wherever there is a liability of trains having to stop, and that liability to stop trains for other than schedule causes is greater in the vicinity of cities and suburbs of cities than in the country, for railroad employes to be on top of cars giving signals when passing through districts where there is no switching being done.

Those signals are generally communicated to the engineer, although sometimes they are communicated from the men on trains [fol. 482] back there or the conductor or other man that may be in rear of the train.

Q. It is customary to have men on top of the cars give signals going through stretches of territory such as that from Delmar avenue to Kingshighway?

A. I don't know just what in detail the traffic requirements are from Delmar to Kingshighway, but it is customary and necessary that trainmen should be on top of cars, not only in places of that kind, but in practically every place where freight cars are operated, and it is for that purpose that cars are equipped with running boards and hand brakes.

Q. As a matter of fact, you don't know how much that condition of men being on top of cars would apply to this particular piece of highway, do you?

A. With a subway under Kingshighway the head-room for which I understand is limited, it would be impossible for men to be on top of cars passing under that subway, but there would be the same necessity westerly or southerly from the Kingshighway bridge as there is anywhere on the Wabash road between St. Louis and Kansas City, and probably to a greater extent because of the greater need there for men on the watch and lookout for signals in and about the suburbs of large cities.

It is the duty of both engineer and brakeman to give signals, because one may give the signal to the other.

I do not know how many overhead bridges there are over the Wabash as it enters the City of St. Louis; I suppose there are quite a number.

I don't know anything about the number of accidents that have occurred by reason of those overhead bridges up to this time. I [fol. 483] have no information on that. I don't know anything about the clearance of the various bridges over the Wabash as they enter the City of St. Louis.

I spoke of policing the subway as being one of the objectionable features.

Q. Do you think proper policing of the depression here proposed would be greater burden than policing of portions of the streets that would pass under bridges that would be necessary to erect to eliminate grade crossings by elevation of the tracks?

A. I don't think there would be any material difference. In the first place, I can't see that any additional policing would be required by carrying a railroad over a street. If any necessity of additional policing did exist, it would be determined to some extent by the number of persons who were exposed to the depredations of the criminally inclined at the given point.

Q. There would be a larger number of people who would be required to go into these subways under these elevated tracks than there would be people taken into the depression if the grades were eliminated by lowering the tracks, would there not?

A. If you mean that there would be more people passing under the track elevation—passing through a track elevation subway—than would be passing through a piece of track depression, the answer is, yes, certainly, a thousand or more times as many, but that any element of danger would exist to the several thousand people [fol. 484] passing daily through a subway, I can't conceive that there would be.

I am to some extent familiar with the police records of Chicago with reference to the number of depredations that have occurred under these subways. About five years ago the matter of grade separation by means either of elevation or depression was gone into very fully with the city of Minneapolis; that matter, together with a number of other matters of similar character, were gone into very extensively, and we had access at that time to the records of the City of Chicago. We had the Chief of Police of the City of Chicago give testimony at Minneapolis, and his testimony was, speaking from memory, but I think I am correct, that there was no increase of crime in the City of Chicago that could be traced to conditions of

track elevation, and that the unfortunate thing about that is if a record of crime of that kind could be kept so you could draw conclusions you would have to have a record of the assaults that took place opposite alleys and doorways and other blind recesses in the street.

Q. But the evidence did show that a great many holdups occurred under the subway?

A. Yes; but not more than would occur in other places of similar character; there are conditions in subways which make it less easy for assaults to take place because as a rule there is a wall along one side of the sidewalk on which there is no way of escape for the bandit.

Q. That wall doesn't increase the facility with which the victim can escape, does it?

A. I guess the victim never has an opportunity to escape.

City Exhibit No. 111 filed.

The memorandum on the back of this photograph simply says [fol. 485] "39th and Wallace," does not indicate its location only in a general way.

City Exhibits 112 to 123, inclusive, filed.

Q. Look at these photographs last submitted as exhibits on the part of the City and state whether or not they represent the typical overhead bridges that are constructed in the City of Chicago?

A. No; I don't think this collection of photos is at all fairly representative of the average track elevation of subways in Chicago so far as my knowledge of Chicago goes. These are taken as a whole of old structures, most of them are quite old. Most of these structures are for subways that cross not under two, three or four tracks, but under yards, and the subways will average much longer in length than some of these average in Chicago. These, with the exception of possibly two, are photographs on streets generally undesirable and not of the best character.

Mr. Brown:

Q. A tough neighborhood?

A. Yes, sir.

Mr. Haid:

Q. Made so by the railroad?

A. No; and what is more, these are not fair photographs in that they accentuate the light and shadows and show the subways much darker than they really are.

Mr. Senti:

Q. As a matter of fact, all neighborhoods get tough after the Wabash runs through them awhile, don't they? It is a matter of fact, isn't it?

A. No, sir.

Q. Those bridges, most of them are on Wabash tracks, are they not? Or could you say?

A. I think some may be, but I don't know. I haven't connected them up.

[fol. 486] Q. Are you familiar with the Wabash bridge crossing at Kingshighway in the City of St. Louis?

A. No; except that I have ridden over it.

The vertical clearance of that bridge, as I understand, is seventeen feet.

I testified that one of the objectionable features of the railroad going under the street was that smoke would come up and be liable to cause accidents on top of the bridge. That condition would necessarily be aggravated in proportion to the length of the bridge; the longer the bridge, the more probability there would be of smoke accumulating there to the inconvenience of the people who crossed the bridge and I think the greater probability there would be of accidents occurring on top of the bridge as a result of the presence of smoke.

I spoke of the Northern Pacific Railway running in close proximity to that University, a group of University buildings and through the ground that the University acquired on each side for a campus and building purposes. The railroad was in a cut. It was originally built that way and the streets were overhead. I said that that was not a matter of primary grade separation in that place. It was similar, however, to depressed tracks such as might be made for the purpose of grade separation.

Q. Was the objection to the presence of this railroad based upon the fact that the track was depressed or its nearness to the University?

A. Based upon a number of considerations; the nearness to the University; the smoke; the noise, and stress was laid upon the fact that vibrations did not interfere very much with laboratory work. Whether stress was laid on that because it was an unusual condition, [fol. 487] or not, I don't know, but it was stressed. The objection was due to all those conditions; smoke and vibration were specially stressed.

Q. The primary objection of the University was the closeness of the tracks, rather than the fact that they were depressed, was it not?

A. I presume that had something to do with it; but that was a condition that existed for years.

I am familiar in a general way with plan submitted by the City for the elimination of these grade crossings from Delmar avenue to Grand drive. I have been told there has been some talk of the removal of the tracks of the Rock Island near Washington University, that it hadn't been seriously proposed.

I don't know about the proximity of Washington University to the tracks. I didn't give that any consideration; I am not ready to express myself on that.

It is my understanding that the City's plan makes provisions for a possible four tracks along the Wabash between Delmar and Kingshighway. I think the Rock Island does not use any part of that 56-foot-wide Wabash right of way at present, or at least not much of it.

Q. You spoke of the necessity for a large number of tracks being a probability of the Interstate Commerce Commission at some future date requiring the Wabash to permit other roads entering the City to use their tracks. Do you find that in laying out of railroad systems of trackage in various cities that has been done?

A. Yes; that has been done. It is being increasingly done and if the railroads of this country are to adequately serve the purpose [fol. 488] for which they are being operated, it will have to be done to a greater extent in the future than in the past. It is one of the crying needs of the hour in many large cities, how an increased amount of trackage commensurate with the growth of the city and of the railroad and the country around the city can be taken care of through city terminals. The terminals are congested and some remedy and relief must be found and in order that that may be guarded, it is absolutely necessary that the possibility of increasing the capacity of every railroad in every city should be conserved.

Q. It is general practice to route them over the lines of other roads?

A. I can only answer as I did a minute ago; that has been the practice to some extent, and is being increasingly the practice and it is acknowledged that it will have to be more of a practice.

At the time of eliminating grade crossings at Philadelphia, the location of some of the lines themselves were shifted. It amounted to an abandonment of some short portions, but it did work out along the very line that we were talking about a minute ago, putting two or three railroads on to one railroad, and while it reduced the number of different pieces of railroad, it did increase the number of tracks and the number of companies that were using the tracks that did remain. That resulted in abandonment of unused tracks.

Q. Is it a fact that the ground water level is affected by the amount of ground water? Does that have any effect upon the ground water [fol. 489] level? I want to know if the amount of ground water would affect in any way the extent to which that would be objectionable?

A. Possibly; putting it another way, you mean the extent of saturation in the soil? Certainly the amount of ground water would have an effect upon the extent of saturation, the more the ground water, the more the ground water level would be higher.

Sewering a given area of the territory would have an effect upon the ground water level. I am familiar only in a general way with the plans of the City for sewerage these tracks. I am not familiar with grade conditions much farther than is indicated on the exhibit.

Q. Do you know present per cent of grade of the Wabash tracks from Delmar to Kingshighway?

A. Only as it is represented on the exhibit that is on the wall, which I take correctly represents what the present grades are.

I did not understand that the station at De Baliviere would have to be removed. I know nothing about the character or kind of structure they have there.

Q. What would be the relative grade of the Wabash over the contemplated improvement as compared to present grade of the Wabash, if you know, on the City's plan?

A. At the easterly end it would involve one long ruling gradient extending from near Lindell to the top of the hill easterly of Kings-highway, approximating something over a mile as compared with a gradient of about the same maximum intensity, possibly a little more, for a distance of only about 2,000 feet. That gradient, however, is [fol. 490] so short and so located that it does not affect to any large degree the traffic which can be taken over that piece of railroad. Running from the other direction the present grade of the Wabash tracks is very slight and approximately level for a long distance from De Baliviere to Olive Street road, and in place of that approximately level stretch there would be substituted a grade of about eight-tenths per cent which would extend beyond that distance and would approximate two miles in length. That change in itself is a very difficult one and it would involve difficult operating conditions. They are, however, very much accentuated by the station at Delmar boulevard, where the passenger trains would have to stop, and the connection with the Rock Island at near De Baliviere at which place the Wabash trains might have to stop and in any case they would have to approach that point with a possibility that they might be stopped.

I have not made a detailed study of the economic results of these grades. The grades show for themselves and are so obvious that a very great detriment would result to the operating conditions of the Wabash, and the only advantage that could come from detailed computations would be whether there would be any in a nature of refinement. I have reference to present grades.

Q. Is this your first view of the grade? Did you have an opportunity to study the plan before?

A. I have had an opportunity before; yes, sir.

Q. Are there any objections that you know of to the change of grade by elevating of tracks, the elimination of the grade crossing [fol. 491] by the elevation of tracks?

A. The elimination of the grade crossing by the elevation of the tracks to a grade line approximating that shown in red on the exhibit would make operating conditions on the Wabash no worse, possibly in some respects would slightly better them as they exist on present grade line.

Q. In carrying out the various projects for the elimination of grade crossings with which you have been connected, has any consideration been given to the wishes of the persons owning property in the immediate vicinity of the proposed changes?

A. Yes; frequently.

Q. Do you know of any reason why depression of Wabash tracks from Delmar to Union would not be satisfactory to property owners in the immediate vicinity?

A. I haven't any means of knowing what property owners actually do think about that, but I am quite clear in my mind that if they fully realized just what was involved by the choice of the three methods of elevation, depression or retention in present way, that a large number would favor an elevation of tracks.

Q. Ordinarily it is the policy of the railroads in the elimination of their grade crossings to give some consideration to the desires of property owners in the community and the authorities of the municipality through which the tracks pass, is it not?

A. To the municipality, yes; that is the policy so far as it comes under my observation; to individual residents, yes, so far as it can be done; but it is well nigh impossible to do that.

Q. If the wishes of a vast majority of the people in the immediate vicinity can be ascertained, with any reasonable degree of correctness, [fol. 492] it is customary to give some attention to that, is it not?

A. If it can be ascertained so that you will feel that you are getting the impartial and intelligent expression on their part, I think it ought to have a good deal of weight, but a railroad that runs into a city and a city that is considering what should be done with a main thoroughfare cannot be controlled, either one of them, by what may be the individual wishes of a little group of property holders. No progress could be made in railroads or in municipal improvements if that is done.

I have reference to a small group, but small is relative; it may be fifty persons in a town of this size or it may be 5,000 or 50,000 in a city of a million inhabitants.

I stated one of the objections to the adoption of the City's plan would be that the view was restricted to Delmar.

Q. After a comprehensive study of the whole plan, could you say the restriction of the view there would be more objectionable than the restriction that would be imposed upon the view by the elevation of tracks for the length of the entire improvement?

A. I think there is absolutely no question about it. By the City's plan the obstruction along the view of Delmar avenue is absolutely cut off by a solid obstruction twenty-two feet in height for the full width of the street. With track elevation there would be a structure across the street with probably three lines of supports and the superstructure, which could be made so it would present an attractive appearance and would permit of a view along the street under and [fol. 493] over the structure. The street would have very little if any more obstruction to view along it than exists when there are street cars passing.

Q. You also stated, I believe, where the streets were elevated the probability would be that the property which was damaged would be permitted to remain in its damaged condition?

A. I can't say as to what would happen in this particular case, but that frequently happens.

Q. You have no knowledge of the character of the improvements that were made by property owners adjacent to the Tower Grove viaduct after its construction in St. Louis, have you?

A. I haven't seen the Tower Grove grade separation for several years, and I am not clear in my remembrance of that.

Mr. Rodehaver:

Q. Do you think any raise in the street or over the street obstructs the view?

A. Why, certainly it obstructs the view. I think a bridge over Delmar would obstruct the view along Delmar avenue.

Q. If the street were left perfectly level and the track went over it, that would be, in your judgment, the solution?

A. That would be, yes.

Q. If the street were left level and the track went under, then what?

A. I want to qualify that. That would be a solution, whether that would be the best solution or not, I don't know. It might be that the view along the street would be better if the street was slightly depressed and the structure was correspondingly depressed. It all depends upon what is beyond the obstruction and the grade of the street.

I said I was familiar with the city's plan in a general way. A raise of seven feet with the building that would be in the background [fol. 494] would, I think, be an objection. It is my understanding that the Jefferson Memorial is in the background. The elevation at De Baliviere is sixty-three; the street is raised two and one-half feet there, I think. I think a raise of seven feet in Union boulevard at the crossing of the tracks would be quite noticeable and would mar the beauty of that street. I don't think with a raise of two and one-half feet at De Baliviere it would mar the beauty. I think a raise of seven feet would be as objectionable as the railroad over it.

Q. In Minneapolis, you talked of depressing the track there for two miles; did that move through a residential section of the city?

A. Moved through a residential section of the city and a business and industrial section also. I said the smoke and noise and vibration were all objectionable features.

Q. You didn't give these any consideration at all in the depression of tracks at Minneapolis, as to what those people might want or didn't want or their peace or comfort or the danger to your own employes of the smoke settling in that cut, and simply to save a few dollars you put in the cut. Is that a fact?

A. No, sir; it is not. We put in the cut regardless of those conditions. I said smoke on heavy mornings will settle in those depressions.

Q. In a viaduct over such as Delmar avenue, on a heavy morning might not the smoke settle down in the street?

A. In case of an elevated track; yes, sir.

Q. Won't that increase the danger on that street?

A. That is a remote contingency, it seems hardly worth while to speak about.

[fol. 495] Q. You said it occurred often?

A. No; not from an elevated track, down in the street below. The smoke may go below the engine wheels, but ordinarily it doesn't fall.

Q. Do you know of a city that your road runs through or that you have had experience with that has the peculiar conditions surround-

ing it that the Wabash has in the City of St. Louis, about high-class residential section from Forest Park to Delmar avenue?

A. That situation is one that is frequently that way. We have situations of that kind in Minneapolis and in St. Paul. Our tracks cross Summit avenue, and the adjoining avenues have a high-class residential district. Our railroad runs into Evanston, and that is a high-class residential suburb, also along the north part of the City of Chicago; we have a railroad within three or four blocks of Sheridan road, which is a very high-class residential district. The Illinois Central in Chicago passes through a very high-class residential district. The Chicago and Northwestern Railroad does the same, especially through Oak Park. There are thousands of instances that I think might be mentioned. I don't think the situation here is peculiar to St. Louis or the Wabash Railroad. I don't think there are any grade crossings left in any of those sections I mentioned.

When I said the height of a freight car was fourteen feet, I was speaking of box cars; the car is about four feet from the rail. There are lots of box cars that are ten feet high; an ordinary box car is much higher than that. Automobile cars are as high as fifteen feet. I don't know how many box cars there are in the United States. [fol. 496] I can't carry that in my mind. A fourteen-foot car is the rule for the later built modern cars. There are in existence on the railroads in this country a great many cars built years ago, and the newer cars are built on larger dimensions.

I mean by the consolidated plans as set forth in the report of the Interstate Commerce Commission that that is a tentative plan that has been promulgated by the Interstate Commerce Commission to indicate a possible scheme whereby the railroads of the country can be grouped so as to form larger systems.

I mean that the Union Pacific or Santa Fe or some other road might use the Wabash tracks into St. Louis; that is contemplated by this plan, and therefore increase the traffic over these rails. The traffic is coming from a good many thousand points west of the Mississippi and the states that lie west of the Mississippi.

The plan is made because it contemplates more corn raising and more agricultural implements manufactured as time goes on when the country is developed, but even if there is no increase in the production of commodities, the channel through which those commodities move may be changed. I don't think it is the purpose of a short instead of a long haul in freight to keep it out of the congested district.

I presume the Wabash today operates through service over all those roads.

Mr. Bowen:

Q. Assume that the Rock Island connection with the Wabash at De Baliviere no longer existed, that the Rock Island came in over some other way; would you still say, without a careful study that [fol. 497] there would be a very substantial annual increase in the cost of operating the Wabash due to the grades proposed by the City as compared with its present grade? The reason I ask that is we have employed what we consider a very able railroad engineer,

who made a careful study and reported and testified there would be no material increase in the cost of such operations.

A. If the Rock Island connection at De Baliviere is eliminated that would eliminate the possibility of having to bring trains to a stop for that connection and would make it possible for trains moving in a westerly direction to operate by momentum partly up the hill, but if they stopped at Delmar that benefit would extend only so far as Delmar avenue, and for freight trains it would not be possible to acquire a sufficient amount of momentum to surmount the two miles of maximum grading that would still remain. That is perfectly obvious; that requires no computations. The only thing computations would determine would be the refinements which would not affect the general statement whatever.

Mr. Rodehaver:

Q. How many tracks have you between Chicago and Milwaukee?

A. Two. We operate a great many trains; forty or fifty trains sometimes. Not as many as fifty passenger trains.

Q. Your schedule shows twenty each way a day?

A. Something like that. I don't carry in my mind how many freights, possibly twelve or fifteen each way a day. Possibly sixty trains in some places; that business varies and there is a very great congestion at some points and there is at present no material difficulty in operating our business at certain other points.

[fol. 498] Q. Two tracks take care of sixty trains a day?

A. The two tracks take care of whatever traffic we have, but at a great penalty of overtime and delay to trains and for switching and things of that kind. We consider our C. & M. Division needs two additional tracks. Estimates have been made at various times for some years past for increasing the rails on that piece of railroad, and the matter is having consideration now and it is the lack of money for that and thousands of other things, unfortunately, requires us to put up with conditions which are almost intolerable.

Mr. Brown:

Q. Does that railroad come into Chicago through a residential district?

A. Yes; our freight on that railroad though is diverted before it reaches the Chicago city limits, and we use a Belt Line that takes us over to our new yard westerly of the city so that the freight business doesn't come into Chicago now at all, except purely Chicago freight.

Q. Through the residential district it is elevated?

A. In some residential and in some industrial districts; we have all kinds. It only comes in partially on elevated structure. We have it also on the surface.

We have an ordinance in the City of Chicago to elevate from the north city limit southerly a couple of miles, then on some elevation a number of miles until we get close to the Union Station.

[fol. 499] G. W. ROROURKE, being duly sworn, testified as follows:

Direct examination by Mr. Burns:

I am sixty-two years of age; I reside at Kansas City, Missouri.

Q. State what experience you have had with railroad work and with reference to maintenance and operating of railroads. Give a general outline of your experience, including the Rock Island.

A. It dates from about thirty-seven years in all, in maintenance of freight cars and motive power. I served in the capacity of apprentice and machinist; that was probably the beginning of my experience. I served in various other branches from that time from chief dispatcher, train master to superintendent.

I was superintendent of the Fort Worth and Denver for two years; superintendent of terminals for the Rock Island; superintendent of the Kansas Division; superintendent of the Illinois Division and general superintendent of the Second Division; at present superintendent of the Kansas City-St. Louis Division.

When assistant general manager of the Second District I had about 4,000 miles under my jurisdiction; all lines west of the Missouri River of the Rock Island. I had charge of all maintenance and operating of the railroad during that time.

Q. State if you are familiar in a general way with the plans which have been outlined by the City of St. Louis for separation of grades between the Wabash tracks, the Delmar avenue crossing and other crossing necessarily involved?

A. Yes.

[fol. 500] Q. Now, I call your attention to two plats on the wall there; the one indicated the Wabash profile from Kingshighway to Page avenue, one being the Rock Island profile from De Baliviere to Pennsylvania avenue, St. Louis. Have you looked over those plans and studied the lines referred to there, showing present base of rail on the Wabash on the plan, and the red line at top showing base of rail of the Wabash proposed plan and same lines on this other map being the Rock Island profile, which will be introduced later?

A. Yes; I have gone over and studied them out fairly well.

Q. On the question of maintenance of both Wabash and Rock Island between St. Louis and Kansas City, as affected by these plans, take the first item of maintenance of base of rail in City plan, it being below ground water level, state what effect it would have on maintenance, both for the Wabash and Rock Island.

A. In the first place, constructing a railroad or carrying on regular maintenance, the first principle is to provide a way so water will be kept away from the track or under the track so it will not soak up the sub-grade under the ballast; whenever we have a condition of that kind, where there is water in the cuts, the expense of keeping it up until that can be remedied by a drainage system is usually about 100 per cent over what it is when properly drained. Under this under-grade arrangement that would place it about eighteen feet below the present. So that with two tracks there, the sun rarely ever strikes it, we might get from the sewers some drainage, but not enough to enable that ever to dry out, so we would always have that

[fol. 501] sub-grade under the ballast continually wet, and with this Missouri mud that we have to contend with in this section, when it becomes wet it is really a dangerous material to have under the railroad.

Q. What is your experience from your long experience as a railroad man, with ground water, does it ever get so it entirely gets away and relieves you from heavy maintenance?

A. It never does; it is always there to be contended with as a maintenance feature. I judge this ground water level proposition extends for about 3,500 feet. It would be an endless proposition of maintenance. It would affect both the maintenance of the Wabash and Rock Island.

We have had trouble with bank sliding in a case of that kind; with this sort of material in this section of the country we are never able to stop the banks from sliding until we build up something in the way of retaining walls, but where they are just left loose, they are continually sliding into the track.

It is quite an additional expense to put in retaining walls. It would have quite an effect on traffic. To reach the lowest point of the undergrade it is eight-tenths of one per cent, as I understand, on both sides. Trains moving westwardly, we will say, must descend about fifteen miles per hour; to do that they would have to begin to slow up about 2,000 feet before they reach the point where the grade changes for the undergrade, and it would be necessary to approach the bottom at about twelve to fifteen miles per hour. Then they would have to start along the ascending eight-tenths without any momentum to speak of, so it would take almost all of the energy of [fol. 502] a locomotive to move ten cars from the lowest part over the entire City plan.

We would have the constant cost of maintenance perpetually on account of this water condition of the rails.

Q. Any other features you think of in reference to maintenance of tracks through that low cut that you have in mind?

A. Yes; maintenance outside of a suitable and adequate drainage, I would say it would be necessary to have from four to six men in a part of it every working day of the year, nearly.

Q. What effect would this have on block signals?

A. It has some, but, of course, with a wet condition of the sub-grades the track gets out of line by settling at the joints, then that has the effect of keeping it out of line and that frequently separates the bonding wires so that of course that would put the automatic blocks out of commission entirely. It affects the insulation, and that is an additional expense of maintenance.

Taking the operating features involved through a cut of this size, to begin with, I believe it would be necessary to maintain a pusher engine at either side of this grade. That pusher engine to help the trains over from the low part to the high point would cost about \$2,500 a month to operate a pusher engine, or between \$25,000 and \$30,000 per year additional expense over what we have now.

There is very much difference between a momentum and a ruling grade.

Our present grades are almost entirely momentum. We haven't any difficult grades to encounter through here. They are from a [fol. 503] level to not over an equivalent of about seven-tenths. That is from Kingshighway beyond the city limits.

To handle a train of about ten coaches to a train the fuel item alone will amount, on present method of operating, to about sixteen pounds of coal per coach per mile. With the City's plan and the additional grade, it would run close to about twenty-three pounds of coal per coach per mile. With the proposed Wabash it probably would be reduced to around ten pounds per coach per mile. That is just one item of expense. Totaled for a day or a month or a year, it is quite a big item. It is perpetual, too.

It necessarily slows up traffic because trains must move slower. It has been spoken of before, the possibility of gas smoke accumulating in the depression and you don't suppose an engineer scouting around there would be able to see only a few feet ahead on a morning when the fog becomes thick, and on that account the trains would have to move slower.

Q. Have you any instances in mind at Kansas City, where you live, of depressed tracks being objectionable?

A. Yes; it is not quite similar, but in a way it is. There is a grade there about nine-tenths in some places and the tracks are as low as twenty or twenty-five feet below the street level, between the depot and the summit and a little beyond there. The signs on houses a few blocks on either side of this depressed track in Kansas City are signs "For Sale," which would lead me to believe those people who have been occupying them are trying to find a different location. Every other house has a "For Sale" sign on it. [fol. 504] Q. That was put in on account of necessity at that time?

A. It was a necessity. The line was built over there a good many years ago, and when the station was located where it is, it was necessary then to even lower this to make lower to about nine-tenths.

Q. Take up other operating features that would be involved. Clearance, what have you to say about that between the base of rail and height of overhead structure?

A. I think it is eighteen feet that it provides for. The standard practice on the Rock Island is twenty-two feet average we build these days. We are trying to get a clearance of twenty-two feet. This is for the sake of safety for men that must ride on top of freight cars.

Q. What restrictions, if any, would there be to shipments over a line with eighteen feet clearance?

A. We have one bridge in Kansas City—the Goose Neck, we call it—with about 18-foot clearance. There is a car about every day in the year that contents must move through that Goose neck and the clearance is not sufficient to let the car pass, and contents must be transferred to another car or two cars made of it, and while it isn't a great amount, it amounts to considerable.

There was a paving outfit came to Kansas City that way and it had to be transferred across the river in Harlem. I think the job was

held up ten days waiting for the stuff to be transferred to get through that Goose Neck.

Q. In regard to safety in operating, I believe you spoke of fogs, etc., affecting it?

A. I think that ought to be seriously considered.

[fol. 505] In the last two years furniture and automobile cars have been built around fifteen feet nine inches to top of cars; there are a great many in use now.

Q. The cars on a train would govern the clearance?

A. Yes; it must be high enough.

I think smoke of engines down in cuts would be offensive for the reason that after the engine starts to ascend the eight-tenths grade, or trains we have even today, and they are growing every year, the engine must come to its maximum capacity to handle the train out of that low place, so that amount of exhaust, I think, would be very objectionable to people living anywhere near by, and the smoke of the engine working so constantly would be just as offensive as so much noise from the exhaust.

Q. State if you are familiar with the length of different lines from St. Louis to Kansas City; tell how it would hamper the future operation of these railroads by proposing a grade separation plan of this kind which would make heavier grades and put railroads into cuts here at St. Louis?

A. The Wabash is the shortest, 270 miles; the Burlington and Alton next; the Missouri Pacific is 282 miles; the Rock Island is 296 miles. Slowing up by reason of that arrangement would amount to about twenty-five to thirty minutes to a train. The Wabash I should say about thirty minutes, and would be equivalent to adding twenty minutes to schedule. It would be relatively the same on the Rock Island.

Q. What about the operating ratio of the railroads now as being high, or otherwise, and would this affect it in any way if this plan was put forth?

A. I am confident it would. The one item of fuel cost would be [fol. 506] quite a factor in increasing the cost of operation and, of course, the maintenance of the property, of the tracks and such things.

Q. In the operation of trains on the Rock Island on a grade of one per cent over the River des Peres, state how that would affect the operation of the Rock Island as to jerking of the trains.

A. It would affect operation very much, and while we are all working towards a lower grade line for the sake of reduction in cost of doing business, this would be quite a step backward; it would be going back to twenty and thirty years ago, when probably one per cent was the ruling grade, and which we tried to obtain mostly.

Q. What is the ruling grade at which you aim now?

A. Five-tenths of one per cent; that is what we are aiming at on the Rock Island, and we are gradually making many reductions each year.

To raise the street grade now at Delmar with a view of carrying out the City plan, we would, of course, always have a hump there,

and if this plan is forced through, and that I imagine won't be a very good proposition.

Commissioner Bean:

If you raised the tracks, won't you have some grade to go out?

A. Yes, sir; we have got it here now in this proposition we are talking about.

Mr. Burns:

Q. Explain what the position would be in case the grade was elevated above the streets and it should become necessary to separate these grades, starting at Delmar, and the separation should be done by elevation of the drive, what effect it would have on the railroad and if, in your judgment, it is a better plan than to force a depression of tracks south of Delmar?

A. I think anything would be better than the thought of depression. It would be better for the maintenance of the property, the operation of it and the more promptness with which trains could move through there, which would reduce the overhead and, of course, at a greatly less cost. I would think the question of cost to be a great factor to be considered.

I think the plan proposed by red lines on the Wabash profile and Rock Island proposed profile would be feasible and the thing most desirable, giving a steady grade and better grade than the one proposed by the City. It is more desirable from every standpoint in my judgment and as an operating railroad man.

Q. In case the proposed grade should be placed by elevating the Wabash and other crossings necessary is it not a fact your operation and maintenance would be rendered much better and safer; you could see the signals better and better other safety features, such as doing away with low clearances, noise, etc.

A. Yes; it is very much the best and less expensive in every way from every standpoint.

City's Exhibit No. 124 marked and filed.

Cross-examination by Mr. Bowen:

Q. You state that the Rock Island is working at a ruling grade of five-tenths of one per cent. Referring to the profile, state what present grade of the Rock Island tracks is between Pennsylvania and Forsythe boulevard?

A. The maximum is 1.44 per cent.

[fol. 508] Q. How does that grade of 1.44 per cent compare with grade referred to as City's proposed grade for the Rock Island?

A. I don't believe there is any comparison, because this is entirely a different situation. The momentum that the train may gather is a factor, and besides if we stopped on this grade, we would have difficulty in starting the train, which is so seldom, except at Clayton, that we have to stop a train on grade of his kind so it is hardly effective. Even if it was, this is in a locality where we

can change or improve that by lowering the grade any time that business increased so as to justify such an expense, but back East, where we have made this depression that is fixed upon the railroad for all time to come, it can't be changed, without upsetting the entire plan and going into another tremendous expense, but with this we could start in next week, so far as any restrictions are concerned and proceed to lower this and improve it or eliminate the heaviest part of it, and we will the moment business over this piece of railroad will justify it.

That has been considered, but only in this way: We considered it each year, but the business of this last year has been quite better, and it has been considered quite seriously of making the change this year, but money matters were a little tight and that was the reason, probably, we didn't do it. We couldn't reduce this to five-tenths per cent because business would not justify it now; it would probably this year or next be worth while to reduce it 1 per cent. This year we discussed to bring it down to six-tenths.

[fol. 509] The grade of the track where it passes present Clayton station is about one and one-half.

Our east-bound passengers stop at Clayton on signal. It is necessary for east-bound passenger trains to start up that grade.

It is possible to eliminate the grades on our line by a detouring of our lines. I am not familiar with any propositions of that kind.

I stated that during the last two years new cars as high as fifteen feet nine inches were being built.

The different types of cars built by railroads are listed in the Official Railway Equipment Register.

Q. We have submitted in evidence a tabulation of all cars in the United States, Canada and Mexico listed in the Equipment Register and have given the heights of them, and we have found no cars in the United States exceeding fifteen feet seven and one-fourth inches in height, and only found twelve of these.

A. I think the Northwestern have some that measure fifteen feet nine inches from top of rail over all over the brake wheel.

Q. Isn't it a fact that the height of a freight car is usually given from the top of the running board to the track level?

A. Yes. You will notice in the Equipment Guide there are two columns, one showing over all and one showing the height of car from top of rail to eaves of car, then another column shows over all; that, I consider, is over the brake wheel.

I am referring to height over brake wheel.

The highest we have is fifteen feet three and one-half inches. I think the Northwestern has, but I am not sure; the Equipment Guide will give it.

[fol. 510] I said a clearance of eighteen feet on the bridge over this portion of the track might interfere with shipments over the line.

Q. Any shipments over this portion of the line would, of necessity, pass under the present bridge at Kingshighway, must they not?

A. I imagine so.

Q. If that clearance is seventeen feet four inches with the introduction of additional bridges with a clearance of eighteen feet, would it offer any obstruction to shipment?

A. Only to this extent. In building, the idea is to give greater clearance; that is the modern idea. I couldn't tell you of any particular shipments this clearance would interfere with, but we have them. We had one, as I tell you, in Kansas City. That was about eighteen feet. It was shipped from Chicago. I think it came over another railroad.

The smoke would be one of the difficulties of operating through the cut proposed by the City; I did not say it would be impossible. Any trains that operate through this district must of necessity pass through the present Wabash cut between Euclid and Kingshighway. I don't know the depth of that cut.

Q. If that cut is 23 feet deep, would you state that in the City's plan which provides for a cut of 18 feet, would offer a more serious objection to passing of trains? I am speaking about both cuts, the City's plan and the other.

A. The cut on the Wabash you speak of is only on one side, isn't it?

Q. Yes.

A. It is.

Q. Would that running into an 18-foot cut rather than a 23-foot cut be objectionable?

A. It is objectionable, yes, and I don't suppose the Wabash would [fol. 511] have had that condition if they could have prevented it; they would have done something else. It would be more objectionable running through an 18-foot cut than running through a 23-foot cut, because the line on either side is not affected. It is more difficult to run through the proposed 18-foot cut than through the present 23-foot cut. Immediately west of Forsythe boulevard our train runs through some deep cuts at present running out toward Clayton. Much deeper than the Wabash runs through, or the one the City proposed. I won't say positively that it is 40 feet deep; that was done so as to meet the grade at either side.

Q. To improve the grade of the Rock Island tracks running west toward Clayton, it would be necessary to lower those tracks several feet in that cut, would it not?

A. Yes, it would be necessary to lower the tracks considerably.

Q. You state there would be considerable increase in the consumption of coal or fuel necessary to negotiate the eight-tenths per cent grade shown on City's plan. That statement is made notwithstanding the fact that all of the trains that your company operates through there pass over these grades of one and one-half per cent as soon as they leave the western city limits?

A. It is rolling and we don't feel it at all.

Q. How would you coast up this hill, referring to map?

A. We don't coast up any; you have got a little momentum here; running the nine-tenths per cent grade they are moving eighteen to twenty-five miles an hour. We are starting right from the foot

of the grade at about fifteen miles per hour. We stop at De Bali-
[fol. 512] viere. This grade running west is nine-tenths per cent.

Q. How would you run up that grade of nine-tenths per cent?

A. Just the movement of the train that we would have at twenty to twenty-five miles an hour; it would be much more helpful than to start at the bottom at fifteen miles per hour.

I don't call those grades of one and one-half per cent difficult with traffic at this time on account of the location.

Eight-tenths per cent as the City proposes would be difficult. We would have to use pushing engines to negotiate the eight-tenths per cent. We do not use them on the one and one-half per cent grades; it is short and in a location where it does not bother us any.

Q. You say you would have to employ from four to six men continuously, in this cut the City proposes, what would they do?

A. It has been my experience in cuts similar to this that you would have to employ from four to six men continually. You spoke of the cut near Clayton; the section gang runs about five or six men, even in the open country as where the track is level with the surrounding country, except that cut, the expense of keeping that up is 25 per cent more than on either side. In that cut we do not have retaining walls to take care of the slope of the cut. I understand the City's plan provides for retaining walls. If that is a fact, it would only affect my opinion as to the cost of maintaining that cut in the way of holding the bank so it wouldn't slide down to the railroad; nevertheless, it would be subjected to continual maintenance of lines and surfacing the track at the bottom of the cut on account of the moisture below.

Q. Is that based on the assumption that this cut would not be drained?

A. So it would properly maintain the track. Yes; cuts can be properly maintained if drained; this is about 3 or 4 feet below the drainage—below the ground water level. I don't know how the drainage pipes are located with reference to the subgrade.

If it is a fact that sewers are provided below the subgrade throughout the length of this cut, the sewer would carry off the storm water but we would always have that moisture in the subgrade that the sewers would not help in any way. The sewer would carry off the flood water so there probably wouldn't be water over around the tracks, but underneath it would always be soft.

Q. Isn't it necessary in every case of roadbeds to drain the subgrade itself?

A. Yes; that is proper, but, of course, the weather has something to do with this. I don't imagine the sun would ever shine on this subgrade. I don't know whether it would or not. I don't know at what angles the sun makes its passage on the different seasons of the year. Especially in the spring, fall and winter it would constantly be filled with gas smoke.

Q. If the slope of this cut is vertical to one and one-half horizontal do you think the sun would shine on it?

A. I would say in the summer months, but on a day like this I imagine it would not, and with twelve, fourteen or twenty trains

passing through there, there would be a constant fog. The construction of retaining walls at the bottom of that slope would tend to prevent the banks from sliding in the cut.

[fol. 514] Q. Wouldn't you have the same trouble of banks sliding from an embankment?

A. Yes; we have that trouble, but on account of it being out in the open, we can haul that stuff out and handle it so much better and cheaper. The sliding would be the same.

Mr. Brown:

Q. Something was said about this Clayton grade; does that go below ground water level at that point? It doesn't go beyond, below the ground water?

A. No.

Q. This cut the City speaks of here where the base of the rail would be below ground water, it would also always be subject to the effects of making a soft track?

A. Yes, sir. I don't believe it would ever dry up; so long as that moisture was there, or wet, we would have that trouble of keeping it up.

The principal thing about the Clayton grade is this—it is difficult for us and it is uncomfortable to the passengers having to take that slack and jerking to start the train, but the reason why we have that condition is because the traffic so far has not been sufficient to justify the expenditure necessary to reduce the grade. It is a condition that can be remedied, whereas, this is a condition that is placed on us for all time, if the plan is put into effect.

Yes; one or two cars on a train governs the clearance; it is I think more dangerous from having cars of that kind and that trainmen forget about the high cars, but the fact that so many lines have begun the construction of these high cars in the last two years it is easy to believe that would be the style of construction from now on. As a matter of fact, I think there should be safe to figure on a 22-foot clearance.

We don't have any regular freight service on this part of the rail-
[fol. 515] road. A switch train uses it about three times a week.

Mr. Burns:

Q. That switch train is apt to have the high cars?

A. It is more apt to have them than most any other part of the railroad and that is the class of equipment that is handled that way.

Mr. Haid:

Q. I understood you to say that these cuts between west of Pennsylvania avenue are 40 feet deep?

A. No; I didn't say so; I think this gentleman suggested that they were 40 feet deep. I am not sure what they are. They are probably 25 feet.

Q. In order to overcome this grade then from Pennsylvania west

what depth would you have to add to those cuts in order to secure that lowering grade?

A. To take care of that trouble we would raise the track from the other side so that the train stopping at the station would be on a level track. I would do nothing with this side until business would justify it.

Q. When business would justify it; what would you do with the grade you say is 1.44?

A. I don't know as we have ever made any survey of what could be done. The natural thing I assume you think we ought to do would be to lower it. If we lower it, it no doubt will increase the depth, but that is not going to help that situation at Clayton.

Q. I am not speaking of the situation at Clayton; I am speaking of your suggestion that an 18-foot cut is going to be troublesome to you, when here you say yourself you have now got a 25-foot cut and will have to make it still deeper to overcome the trouble?

A. The conditions are not comparable at all.

It doesn't look reasonable that, because we have one bad condition on the railroad, another should be forced upon us.

[fol. 516] We own 980 cars that are 15 feet 3 $\frac{3}{4}$ inches. Here we have another class of 490 cars of 15 feet 3 $\frac{3}{4}$ inches, and 125 that are 15 feet 3 $\frac{1}{2}$ inches and then 806 other cars that are 15 feet 3 $\frac{1}{2}$ inches. Those heights are all above the rail. These are shown on pages 462 and 463 of the Register.

We also handle cars of the Chicago & Eastern Illinois road; a great many cars from that road come on to the Rock Island.

Referring to page 466 of this Register, I find 844 cars of dimensions higher or having a height of 15 feet 2 inches and 120 having a height of 15 feet above the rail. Here is another series of 15-foot cars above the rail, 350.

Q. Turning to the St. Louis & San Francisco, you handle a great many of their cars and the Wabash does also; here are cars 15 feet 3 $\frac{1}{2}$ inches above the rail?

A. Three hundred eighty and 3,960 cars of 15 feet 2 $\frac{1}{2}$ inches; 738 of another series and 604 at 15 feet one-half inch and 311 at 15 feet 4 $\frac{1}{2}$ inches.

Q. Taking the C. M. & St. P., and turning to page 534, there are cars having a height of 15 feet above the rail and how many in that class?

A. Nine hundred thirty-three; another class, 995, 15 feet above rail; 927 of another class 15 feet 2 $\frac{7}{8}$ inches; 248 general service cars having a height of 15 feet 2 $\frac{1}{4}$ inches above the rail; 334 of this series of a height 15 feet 2 inches.

Mr. Bowen:

Q. None of the heights you read were 15 foot 9 inches.

A. I don't think we had a page of the Northwestern.

Mr. Hall: The heights given by Mr. Rorouke from the Register are the heights over all.

[fol. 517] Mr. Rodehaver:

Q. What is your clearance on your line between St. Louis and Kansas City?

A. It varies.

Q. What is the extreme clearance of freight that you can haul between St. Louis and Kansas City?

A. I think 20 feet; I won't be positive. The height of tunnel 27 is 17 feet.

Q. How can you have an extreme clearance of 20 feet for a tunnel of 17 feet?

A. I didn't think of the tunnel. The tunnel has been in there for 25 years; if building it today, we would build with a larger clearance, both from side and top.

Q. That doesn't affect movement of freight today?

A. No.

NED H. SAYFORD, being duly sworn, testified as follows:

Direct examination by Mr. Brown:

I am a civil engineer, specializing in flood control, drainage work and hydraulic work. I am president of the Morgan Engineering Co. We have two offices; one at Memphis, Tennessee, and one at Dayton, Ohio.

I am a civil engineer graduate of a technical course of Lehigh University; my experience has covered a period of about 18 years; almost the entire length of that time has been in sanitary and hydraulic work. I have been with the Morgan Engineering Co. eight years.

Our plan of operating is that each principal member of the firm looks personally after certain projects that come to the company. All of use have become more or less familiar with all of the projects that are handled by the company. I personally handled [fol. 518] since coming with the Morgan Engineering Co., about 12 or 15, perhaps 20 projects varying in size from an expenditure of a quarter of a million to a million and a half dollars. I have been familiar with practically all of the operations that have been handled from the Memphis office and to a less extent with those handled from the Dayton office. Our total operating amount to present time is about eight to ten million; I mean we are engineering for projects which amount to that much. We have handled altogether since I have been with the company, including the work of the Dayton office, perhaps sixty million to seventy million dollars' worth of work, all hydraulic in character.

Q. Have you, at request of railroad defendants in this case, made some investigation of the flood conditions around Delmar avenue, in the City of St. Louis at the point that avenue is crossed by the Wabash Railroad tracks?

A. Yes, sir.

Q. In this connection have you examined the plans of the City and other data that has been furnished to you?

A. I have not examined the plans of the City directly; I have obtained information relative to their plans relating to hydraulic features from other data I have examined.

I examined a report made by the engineering force. I am told of the City of St. Louis, regarding the hydraulic conditions pertaining to proposed improvement. I examined a report by Mr. Burdick of the firm of Alvord & Burdick, made on the same conditions; I have seen a profile furnished by the railroad as showing elevations of the [fol. 519] proposed cut and ground elevations adjacent thereto and I have seen a map of the general territory with other of my data. That data contained information as to the flood of 1915.

Q. Was that information of such character and of such extent as to enable you to reach certain conclusions?

A. Yes, sir. I have assumed that the mathematical work in the two reports I have mentioned is correct. I examined them for the method employed, rather than to correct the actual mathematics. I found there was a difference in the discharge estimated to have passed through the Wabash cut as set out in the report by the City, and as set out by Mr. Burdick's report, and that led me to examine that particular feature more carefully than the rest. I concluded after correcting the computations in Mr. Burdick's report, in which he gives both the elevations furnished by the railroad and the City, of water surface passing through the cut of 1915, that the computations prepared by Mr. Burdick were correct and that those of the City were incorrect. The computations prepared by the City indicate the 2,300 second feet of the 7,300 second feet, which both engineers assumed to be correct, passed through the Wabash cut, whereas the computations of Mr. Burdick in excess of 3,000 feet passed through the cut. My correction of those figures agrees with Mr. Burdick, that is, so far as I did correct the mathematics, the actual multiplication, addition, subtraction, etc. The statement is made in the report by City representatives that with the difference between 7,300 second feet and 5,000 second feet and 2,300 second feet, rather, which is 5,000 second feet, they determined that a certain formula which they used and collected the actual observed losses of head through the bridges very closely. It is my opinion that had they used the correct discharge through the Wabash, thus getting at the correct discharge down the river, that formula which they used would not have collected the observed differences in head or losses of head. Had they used the correct discharge in the river, another formula would have been devised, the form of which would necessarily, to fit the observed needs, have been such that when applied to the greater flood, that is to the 7,300 second feet which would have passed down and which had it been excluded from the Wabash cut, would have produced an elevation somewhat higher at Delmar and at each of the points of bridges at which elevations are computed, than those shown by the City in their report.

Q. Your conclusion from that is that the actual depth of the water north of Delmar was greater than shown in the City's report?

A. Not that it was greater, but had it been excluded from the

Wabash cut it would have been greater than the City states it would have been.

Q. According to your figures would the retaining walls of the City along to the north and west side of the right of way have excluded that water from the Wabash cut?

A. From information I have the wall is proposed to be less than half a foot higher than the elevation that the City states would be the elevation of the entire flood which went down the river. As I stated before, I think the City's elevation should be increased, how much, I do not say, because I have not computed it, but I am convinced it should be increased. Whether or not it would have to be increased more than that half foot, I am unable to say, but I believe it would.

Q. From the examination you have given the project, what is your judgment as to the City's plan for this River des Peres culvert being reasonably adequate to take care of flood conditions as shown in the information you have examined?

A. I have not examined it with the idea of determining the capacity of the culvert itself, but that the works as proposed, assuming the numerical work to be correct, assuming, too, that the culvert is to extend to Kingsbury, the project would not be adequate against a repetition of the 1915 flood, certainly not against a storm greater, and in any case it does not provide the same degree or factor of safety that similar works built elsewhere which provide properly and which are accepted as in general practice.

Q. It is in evidence in one of the City's Exhibits wherein I think it is conceded that the area of that permanent sewer is 30 per cent greater than the area in this proposed viaduct sewer, is that significant in your mind as to whether this viaduct plan is adequate, or that it does not provide a reasonable margin of safety?

A. If automatically there is to be 30 per cent greater capacity than provided by present plan, it is indicative that some one believed present plan not adequate.

I examined Mr. Burdick's report. My conclusions do not differ in any material respect from his.

Cross-examination by Mr. Horner:

Q. You say you have examined Mr. Burdick's report?

A. Not thoroughly; I have examined it.

[fol. 522] Q. You believe his methods are correct?

A. Substantially so; I think there is room for a difference of opinion with reference to certain facts.

Q. Then you would not be inclined to believe without further investigation that the elevations which he predicts for a recurrence of the 1915 flood, and with culvert extended to Kingsbury as out of line, and that his tables are probably correct?

A. Not necessarily, but in the neighborhood of correct.

Q. Then you would also say then that any further testimony of Mr. Burdick derived from the same figures and changed conditions of extending that culvert slightly down the stream would be correct to the same extent his original figures are correct?

A. Yes, I would say that. I want to explain that I was called in fairly hurriedly on this case, and that some data was furnished which I did not have time to examine.

Q. Mr. Burdick stated he examined that report and found that it provided for a flow of about 30 per cent in excess of the flood of 1915. Would you consider that an ample factor or provision for a permanent construction of that kind?

A. I couldn't say without further investigation. I can visualize factors that might make a great deal greater factor than that necessary. I would certainly provide in a permanent structure for a greater flood than the 1915 flood.

Q. You are not prepared to say whether 30 per cent is right?

A. That is correct.

Q. Mr. Burdick also testified from the City's Exhibit, that the grade of this proposed permanent improvement at Delmar avenue, [fol. 523] that is the grade at the top of the sewer, was 13 feet lower than present tracks of the Wabash Railroad. You would consider a 13-foot over protection against overflow of the tracks ample?

A. Assuming the project has been reasonably well determined.

Q. Some question has been asked as to the Wabash tracks being flooded as a result of the River Des Peres overflowing from a recurrence of the 1915 flood. In the event of a permanent improvement of the River Des Peres, as outlined in the report which provides for 30 per cent more than the flood of 1915, and the gradient 13 feet below the Wabash tracks, would you consider there a possibility of the water rising out of that sewer and overflowing the tracks?

A. I am going to repeat that it might. If the hydraulic gradient, as it is determined as nearly as possible, is actually, in fact, 13 feet below the elevation of the tracks themselves and adjacent to the water, I should say that was an ample factor of safety. Do I understand you to mean that the hydraulic gradient would be 30 per cent increase in the increase in the capacity flowing through there would be 13 feet below the Wabash tracks?

Q. Yes, sir.

A. Yes, sir. Our company has been connected with flood studies at Dayton. I, myself, took some part in the rainfall statistics. I took no part in the preparation of pamphlet, "Storm and Rainfall in the eastern United States." I can't say I am thoroughly familiar with the subject matter of it. I am familiar with the early stages of it. I am familiar only in a general way with the studies of frequency and results in this pamphlet.

[fol. 524] A diagram is presented here in which a part of the United States is cut into rectangles. They are approximately 125 miles long by half as wide. The rectangle in which St. Louis lies has in the center the figure 6.6. That figure is supposed to represent probable frequency with which storms of 6.6 inches, in one day, are likely to fall. The frequency given at bottom of that diagram is 100-year period. That is not a prediction; that is a compilation of the best data available. It is not put out in the same sense that weather predictions are made; it does, though, show the record of limited experience.

Q. That is the only thing we have to go on in determining the future probabilities of that character?

A. That and the ability to project that experience intelligently ahead. I believe the studies are as full and ample as any ever made. I am going to explain further that figure 6.6. That applies to the frequency with which storms of 6.6 inches, in one day, will occur; I am not certain whether it is at a certain point or over a considerable area.

Q. If it is probable, from the best information we have from experience, that a rainfall of 6.6 inches would occur only once in one hundred years, it is extremely improbable that the rain of 1915, which has been shown in the evidence here to have been 10 inches in one day, would occur with as great a frequency, is it not?

A. It has been so long since I have examined that; if it is correctly registered at one point; yes, sir; if you are uncorrect in that—no, sir.

Adjourned to November 17, 10 o'clock a. m.

[fol. 525] H. F. ROACH, being duly sworn, testified as follows:

Direct examination by Mr. Brown:

I reside in the City of St. Louis. I am an architect. I grew up in the profession; my father was an architect and started me at the age of 8 years; he also trained me in mechanical lines and made a mechanic of me when I was 14 years of age. I afterwards attended the Institute of Technology, Boston, and then was admitted as a partner. About a year after that I went to Europe to study, that is, travel in the countries of England to, and including, Greece, and after returning my father and I designed a great deal of work and built a great many buildings in the City of St. Louis, including residences, mercantile buildings, factories, etc., and in 1903, I think it was, he retired and I continued in the work. Some of my work, such as the Syndicate Trust Building, cost somewhat in the neighborhood of a couple of million dollars; the Times Building, the Buckingham Hotel, the Seruggs Annex.

My life has been spent in the work of designing and construction. I reside at 5869 Clemens avenue, about two blocks from the Wabash Railroad. That is in this neighborhood of the Delmar crossing.

I have had occasion to examine into this question of grade separation; there has been a good deal of discussion on that subject.

Q. You understand I assume the plan of the City, the first part of their complete plan is to build the viaduct over Delmar avenue, over [fol. 526] the railroad right of way and tracks? And the right of way north of Delmar avenue, to the city limits is to be elevated over the intervening streets?

A. Yes, sir.

Q. To the south between Delmar and Kingshighway the track is to be depressed or put in a cut.

A. Yes.

Q. And the street carried over the right of way and tracks by

means of a viaduct or street bridges. On the other hand the Wabash has said that when the time comes for the separation of those grades, that result should be accomplished by elevating the tracks and constructing bridges in the elevated track structure over the streets throughout this territory. The City's objection to the plan of elevation is directed to two points chiefly, first that the embankment on which the tracks are proposed to be put would be unsightly, second that the railroad bridges over the streets would be unsightly. Taking the first question of the railroad on an embankment as against a railroad in a cut or depression such as the City proposes, which cut reaches a maximum depth of 22 or 23 feet at De Baliviere avenue, I wish you would give us the benefit of your views stated in your own way as viewed from the standpoint of a designer and an architect?

A. Briefly I would say a better unit whole would be composed by the elevation rather than in the depression. The elevation of the street over the viaduct would offer an interruption in prospective in the shape of a repellant surface that would be objectionable; it would lead to disappointment.

Q. What do you say as to the proposal of the railroad to put the track bridges over the street?

[fol. 527] A. That is a proposition of producing a picture in which the perspective is arrested and making possible the introduction and so proportioning of surfaces and producing lights and shades that would give depth to the whole and produce beauty.

The elevation plan offers opportunity for treatment that would produce a condition that would be an ornament to the City of St. Louis; the depression plan would offer opportunity for the injection of many little objectionable features such as, putting two banks through Forrest Park. Where these two banks would reach, for example, Grand Drive, and the bridges extending across between them, there would be no unity between the elements of the bank and the bridges themselves; there would be no reason of being in design for that composition, it would be offensive, technically speaking.

Q. They propose to reconstruct Grand Drive and put it over the railroad.

A. That alters that testimony I have offered there; I assumed they intended to run that Grand Drive under the railroad and stop these banks at the track, so that part of my testimony I just gave where I said there was a lack of unity between that bridge and those banks won't apply.

After looking at the model I say the unity of the whole proposition is such that the elevation offers opportunity for splendid treatment, whereas the depression does not.

Q. Going back to these embankments that the City seems to find objectionable when they are outside of Forest Park but themselves propose to construct in Forest Park, what can you say about the [fol. 528] feasibility and practicability of so treating those embankments as to make them pleasing to the eye? I am talking about the elevated embankment outside of the park.

A. There is no difficulty in treating that surface so as to produce

a design that would be satisfactory for the reason that color could be used to assist.

Q. Would there be any practical difficulty of sodding or seeding the embankments and putting shrubbery upon them just as the City has done in the park?

A. Oh, no; not only that, but color could be introduced there just like you would introduce it in any other place for satisfactory treatment, only of course adopting to that particular condition.

The embankment without anything on it must be treated in a little different manner from the embankment that has something on it, either one of them can be made beautiful; it don't make any difference which you take; you can make any structure beautiful if you go at it right.

Q. Your thought is that the embankment which carries the railroad tracks might be a little different from an embankment that carried nothing?

A. It has this in its favor, that anything that serves a purpose and proclaims its purpose always is more acceptable in design; the purpose of a screening bank is a little different from that of a bank that carries something; a bank that simply serves the purpose of a screen don't need much mass or strength, but one that needs to support a load requires mass and strength and you feel it; you know it without being told, therefore that bank that is carrying a load has a use and it is satisfactory and can be made so easier in treatment.

[fol. 529] Q. If the City says they are putting those banks in the park for the purpose of screening the ditch, they propose to set those as a screened bank; now we propose to build an embankment outside of the park to carry the railroad, is there any difficulty about treating the embankment outside of the park?

A. None whatever.

I would like to have this matter introduced in the record as a premise.

Design

"The art and practice of so arranging forms and colors, or objects having form and color, and that there are reached certain definite results intended to be agreeable to the eye and to embody some idea of the designer.

"By extension, the art of bringing to completion any visible and tangible work of human thought and skill.

"What is wanted is the art which shall use all materials in a fine and reasonable way, making the forms moreover, carry, some spirit-containing quality which we call Beauty.

"All design is a dealing with certain problems in the light of a body of observation and experience. As to general arrangement, we are mostly agreed that the first consideration should be utility; and as to construction that it should be governed by stability. Beyond this there is no agreement as to elements and no recognized basis of criticism, other than Archaeological correctness—judgment by

authority. All criticism of Art which is not a mere expression of [fol. 530] 'taste' comes to this. It is either a statement of 'authority' or it examines a work 'according to reason.' It is those organon of reason as applied to modern design which we are here concerned with.

"But if a name must be found, it should be wide enough to include all these together and to cover the whole ground between the four cardinal points of art, nature, tradition, requirement, material.

"Invention would be a better term than design for the production of a new or partly new composition in form or color or both."

The above from Dictionary of Architecture and Building, by Russell Sturgis.

"There are certain phenomena having their origin in that mysterious thing the human brain, which are incapable of definition—invention is one of them. We may study its manifestations and characteristics, but define it we never can. And in thus studying it, it is evident that we may approach it as a pure mental act, or as it discloses itself in concrete form. At its foundation, an invention is an idea—as Robinson says, "an idea of means." It is a mental act, a conception, a revelation.

"The same indefinable condition exists with reference to taste, which may be well illustrated by the common folklore suggested by 'The old woman who said it was merely a matter of taste after she kissed the nose of her cow.'"

Q. There is no difficulty of so treating those bridge structures as to make them harmonious.

A. There is not only no difficulty but it is something a man can afford to pay for having the opportunity to make something good out of. They can be made things of ornament.

[fol. 531] I have had occasion to walk along the Wabash Railroad south of Delmar and I am familiar with that neighborhood. That picture is a good one of the cut of the railroad down south of Delmar and a good representation of the way things look along there. It is used as a sort of dumping ground through there. I see the cans and ash heaps and things of that kind.

Q. Alongside of that, look at the elevated embankment and bridge structure carrying the railroad in Forest Park, that is the bridge across Grand Drive?

A. Yes, that is the question of getting depth in your picture. As an architect and designer I see nothing incongruous or repulsive about that; there is this about that, therein enters taste, one man will say "I don't want a certain style;" another wants this style; just so long as the laws or lights and shades and propositions are obeyed, then design is satisfied and the individual taste is another question.

Q. What you have in mind, isn't it, is that you might personally prefer a more massive design for the bridge structure?

A. Possibly; or some other landscape artist or architect might require a more delicate treatment to suit his personal taste.

(Photographs are marked Wabash Exhibits 24 and 25.)

Q. It is in evidence here that the Wabash right of way south of Delmar is 56 feet in width and as I stated before, the City proposes to construct the cut to a depth of about 22 or 23 feet at De Baliviere. Take that depth of cut in that width of right of way what are the possibilities of so treating the cut as to make it beautiful?

A. I don't see that there is anything to treat; it is simply sunk [fol. 532] out of sight, if I understand the situation correctly. I don't know of any method of treatment except to put concrete walls along there or some kind of an embankment that would maintain it.

Cross-examination by Mr. Bowen:

Q. Have you examined the City's plan to know whether it proposes a depth of 23 or 24 feet?

A. No. I mean I haven't gone into that detail. I simply accepted the statements given me and have seen what I have seen up here on this exhibit. I have not examined the City's plan to know whether there has been provided items of sodding along these banks; I know nothing about that. It would make a decided difference in the appearance of your embankment how you treated it, sure.

Q. The Wabash Railroad in Forest Park runs part of the way on an embankment and part of the way on level ground with a grade crossing east of Grand Drive and part of the way in a cut in Forest Park. Do you suppose there are any cans and rubbish in that cut in Forest Park?

A. No; there is not going to be anything of that kind there. The embankment in Forest Park has some grass and trees and shrubbery along the sides. That embankment is too steep for maintaining a good sod. A good embankment can be kept properly sodded. And you can introduce color; you have to provide a line at the top of that embankment to give yourself light and shade effect.

I see no difference between keeping an embankment on which a railroad operates properly sodded and shrubbery growing there as between an embankment on which a railroad is not operated, except [fol. 533] that one the satisfaction of expectancy always that is present in it, the purpose it is serving. There is a ballast under the track along the top of the embankment at Forest Park.

Q. You are familiar with the Lumiere Process of Color Photography? Does that picture show ballast extending down the bank?

A. I wouldn't say so; I don't know; you know better than I do. You have been there and seen it. The picture shows an interruption of the sod which may be washed ballast. No, I wouldn't say I made an examination of the ballast from Union to Kingshighway.

Q. Would you say it is not a fact that all the way the ballast does not extend down along the sides of that embankment so as to prevent the grass from growing on it?

A. If it does, it is simply neglect; that is no reason for determining against an embankment. I don't know whether the Wabash Railroad Company's plan for track elevations between the city limits and Grand Drive provides for a sodding of those banks or planting shrubbery on those banks. It would make a very material differ-

ence in appearance whether or not it was sodded and shrubbery planted on it, certainly.

I am a member of the American Institute of Architects and a member of the St. Louis Chapter. I never took part in any competition in my life except once when I was a young man.

I am not familiar with City's Exhibit 37 which shows the proposed bridge at that point except as you show it to me now.

Q. Can you state from an examination of that picture whether or not that would make an attractive looking structure at that point?

A. It would not make an unattractive view of two streets, on the [fol. 534] contrary, it would make an attractive one of the two streets.

I live two blocks north of Delmar. That is the district in which the City proposes to elevate the tracks. I am actively engaged in the practice of architecture; my work has been consulting during the past year. I have been called in on various pieces of work relative to operating with other architects. I have made a lot of sketches during the year but I have not built any. I have not done any actual execution of work, I think, since 1917.

I am the inventor and proprietor of the Roach Rail Joint.

Q. State briefly what the joint is so we will understand.

A. It is a means of connecting the ends of the rails of a track so as to preserve the ends of the rails in the respective planes as to line and surface under rolling load. I have those made and sell them to railroad companies. The Wabash and 35 other roads buy from me. The Rock Island bought some of my joints a number of years ago. I have never done any business with them since.

Redirect examination by Mr. Brown:

Q. The Wabash crosses Clemens avenue, the street on which you reside at about 6000?

A. Isn't it 6100 or is it 5800? At any event, Hodiamount runs there. All that district in which I reside clear out to Delmar is improved with quite high-class residences. It is the old Cabanne district which stands pretty well.

I understand the City proposes to separate the grades north of [fol. 535] Delmar by this elevation putting the railroad track up on the embankment.

Q. Will the presence of the railroad on an elevated embankment down there damage that residential neighborhood in which you live?

A. Oh, no; that residential neighborhood is as good as it is south of Delmar.

Mr. Rodehaver:

Q. Would that depression of track injure real estate?

A. Yes; it would.

Q. Have you ever ridden on the Wabash train leaving Delmar station going to Chicago?

A. Yes, sir. There are some deep cuts there; I don't know whether there are fills or not; there must be if there are cuts. I have noticed that. I have taken the night train.

W. T. CATTERTON, being duly sworn, testified as follows:

Direct examination by Mr. Hall:

I reside at 609 Hamilton avenue, St. Louis. I am local agent of the Wabash, Delmar avenue station. I have been local agent at that station since January 1, 1915, continuously. I was on duty at that station on August 20, 1915, at 6 o'clock in the morning, the morning of the flood. That flood got into the Wabash depot at that point. It reached to the waistband of my pants when I went out, that is about 3 feet 6 inches. I am 5 feet 11. The water reached that elevation at about 8 o'clock in the morning and it began running in on the floor, and between 9:45 and 10 o'clock was the time I left the building, when it was that depth. Our supervisor, Mr. Neitman, was in the building with me at the time. The platform [fol. 536] had raised up with the flood and there was one end of it near the depot and one reached across to the other side. I started to go across on that and as I started to cross it slipped and there was nothing else to do but to jump off and swim for it, which I did. I swam about 10 feet. I don't know how deep the water was there; I did not strike bottom. I didn't take no chance at all; as an explanation of where I jumped off, was where the platform had formerly been, it was naturally lower there, but I didn't go down to the bottom to see.

Q. It was about how deep over the rails of the track at that point?

A. The rails, I presume, were some 12 or 14 inches lower than the platform of the station possibly. I should judge about 4½ feet over the tracks.

Neitman stayed on that piece of platform until it lodged against one of the crossing gates on the south side of Delmar crossing; it swung around to a high point; there was a high bank on the east side of the tracks; it was between 9:45 and 10. The last train that went by that day was the westbound train 736.

Q. Did you observe any experience any passengers had who got off at that station on that morning?

A. I did. There was one lady and one boy got off an earlier train going into the depot, that stayed there until about 9:30 and the fire department came and got them. They were in the depot and we managed to keep them up in the dry on top of a box on top of the desk. The fire department backed the truck as far as they could on Delmar and then carried the lady and boy across to the truck.

I was there until 11:30 and then I went away from 11:30 to about [fol. 537] 1:30. The water reached its highest stages possibly between 10 and 11 o'clock; the water remained in the building until 10 o'clock that night. We got our first train over that line at 2:15

the following Sunday. The track was entirely out of commission from 7:30 on Friday morning until 2:15 Sunday afternoon following.

Q. Did you observe the condition of the track there in a general way as to what effect of the flood was on it?

A. Only there at the depot; there was a great amount of rubbish washed down on the track, ties, cordwood, miscellaneous collections that would float.

Q. When you saw the flood that morning how did it go with reference to the railroad track south of Delmar?

A. There was a strong current of water to the east of the depot, flowing in front of the depot. The River des Peres is west of the depot; the depot is between the River des Peres and the railroad tracks. The current was swift enough to carry that platform off that the supervisor and I had taken passage on. After I returned there about 1:30 on Friday afternoon I remained until 5 o'clock that evening. The water continued to flow down the railroad tracks during all that time. I presume the water extended in Delmar something like a block away.

The territory north and west of the tracks was flooded. You could see there as far as Olive Street Road, that is, the third street west, third crossing.

Q. The third street north of Delmar?

A. Yes; and all to the northwest of there. I could see the water up as far as Olive Street Road; that is where you crossed the tracks.

Q. But west of the tracks?

A. Oh, as far as Rosedale up to the Polar Wave, west of the tracks [fol. 538] as far as I could see. Rosedale avenue is west of Delmar station. There is a large industrial section lying west of the Wabash tracks and north of Delmar.

(Photograph marked "Wabash Exhibit 26.")

This shows a view looking south, north and west from a point north of Delmar and west of the Wabash tracks along the west bank of the River des Peres. All this territory that is shown by this picture up to the north and west there was under water.

Q. Can you state either from memory or from this memorandum some of the industries that are in that section north of Delmar and west of the tracks that were under water at the time of the flood?

A. Polar Wave Ice and Fuel Company, Hunkins-Willis Lime and Cement Company, Missouri Portland Cement, Parker-Washington Paving Company. They are on the west side of the tracks. On the east side are Donk Brothers, Thomas Ryan Feed Company, at that time; S. A. Weissenborn & Son, Union Fuel Company, United Railways track; that was all under water. You have listed here the Lumbermen's Mill Work Company. They were not located there at that time, though the property they now occupy was under water.

Q. Have there been other high waters there during the period of time you have been agent there?

A. There has been on two different occasions that the water was high enough to flow down between the rails as far as the station, since this flood of August, 1915.

Q. Would the River des Peres be out of its banks?

A. Not necessarily so; no; the river was not out of its banks; it [fol. 539] was caused from the upper branch overflowing at Olive Street Road. That is the branch that comes into the River des Peres at that point.

Commissioner Bean:

Q. The water flows towards the east, then, down the track?

A. No; towards the south. The tracks run practically north and south and the Delmar crossing at right angles, east and west. I never talked with any of the neighbors as to the effect of the flood on their property with reference to cellars being filled with water at time of the flood.

Q. What provision is there made at Delmar crossing for control of traffic on the street when trains are approaching the crossing?

A. Crossing watchman continually on duty with crossing gates and a bell. We have three shifts of crossing watchmen, eight hours each. The gates are the ordinary crossing gates they are lowered by air pressure. They have red lights at night on each of the four gates. There is a large bell fixed at the corner of Delmar nearest the crossing. It is customary for the watchman to give signals and warnings when trains are approaching, to sound the bell distinctly before he starts to lower the gates. This is in order that traffic may stop before the gates interrupt the traffic. Then he starts lowering the gates, and I never timed it, but sufficient time before the train crosses.

Frequently the people disregard the signals.

Q. Reports have been introduced here of accidents that have occurred at that crossing? Have you observed a number of such accidents there?

A. There has been some gates broken. That was for disregarding the signal, not stopping, continuing on through. The gates would be lowered or were being lowered and sometimes a wagon, more frequently an automobile, would drive right through the gates. [fol. 540] I have known of no injury there, no one struck by the train.

Mr. Hall:

Q. You were not present at the time that street car got stalled on the track, were you?

A. No, sir.

Q. What is the practice there with reference to the stopping of outbound trains, with reference to clearing the crossing after the train has passed?

A. It is the intention and general practice that the train clears the crossing so as to be no delay to the traveler. The crossing gates are raised. That is the rule, though there are times when they can't raise the gates; possibly a train will have two or three extra cars.

Cross-examination by Mr. Bowen:

Q. You stated it is the general practice that the trains crossing Delmar boulevard clear the crossing; you are referring only to the northbound trains, are you not?

A. The northbound trains.

Q. Southbound trains usually stop, blocking the street?

A. Passenger trains necessarily have to in order to get the baggage car to the platform; that is, southbound trains.

I stated since I came on duty at this crossing, water has come down the Wabash tracks since the great flood of 1915 on two different occasions. I am referring to water on the Wabash tracks north of Delmar. The water I refer to got on the tracks from a branch of the River Des Peres. Since I have been there, with the exception of the flood of August, 1915, the River Des Peres at Delmar has never risen above the level of the bridge. I don't [fol. 541] know that I would say that the Wabash tracks in the neighborhood of Olive Street road have been flooded comparatively frequently; twice that I recall since 1915. I could not say what month it was. I do not specifically know the cause of the flooding of the Wabash tracks in the vicinity of Olive Street road.

Q. Do you know whether the Wabash Railroad Company's tracks were flooded because of the flood of August, 1915, at points other than the line between St. Louis and Ferguson?

A. No, I am not familiar with that.

Mr. Rodehaver:

Q. In your opinion a recurrence of the flood of 1915, if the tracks were elevated north of Delmar, would still flood all those industries that you have referred to?

A. Yes, the industries left on the same grade they are now.

Redirect examination by Mr. Hall:

Q. The City has introduced a great deal of evidence here about the large number of automobiles that pass that crossing in a day's time, about 7,000, and the large number of street cars that cross that crossing in a day's time, about 1,100, and the large number of passengers carried on those street cars, about 33,000, and a large number of foot passengers running into the hundreds in a day; has the City of St. Louis at any time ever provided and stationed a traffic officer at that crossing to care for or protect the great number of people that travel back and forth over that crossing?

A. They have not. I know the City provides traffic officers at Grand and Washington and Broadway and Olive and Twelfth and [fol. 542] Locust and many other places in the City of St. Louis to take care of merely foot and vehicular traffic, but they never have stationed a traffic officer there.

Mr. Rodehaver:

Q. In your experience as an agent there, have you ever known them to fail to lower the gates when a train was coming?

A. There has been times when the gates would be out of operation, and the man would have to get out on the crossing with his sign.

Q. Regardless of the gates being out of order, have you ever known them to fail to lower the gates at the approach of the train?

A. Not to my knowledge. At present I go on duty at 7 in the morning, and off at 4 in the afternoon. On the night of November 8th, I was not on duty when the 9:32 train for Chicago came along.

Recross-examination by Mr. Bowen:

Q. You state that traffic officers have not been stationed by the City at this crossing? Were you present at this crossing at the time a Market street car was struck by a northbound Wabash train?

A. No, sir.

Q. The evidence submitted showed an officer was present at that time and ran down the track and flagged the train so that the train slowed up sufficiently that its impact, when it struck the car, was very slight and only tipped the car over to one side. Are you ever there in the evening?

A. Not after 4 o'clock.

Q. Do you know whether it is the practice of the City police department to send officers there to meet incoming trains?

[fol. 543] A. We make a request frequently upon the sergeant to have one there; the request is generally complied with, but he does not direct traffic. There is no officer stationed there. There is an officer walks the beat there the same as in any other part of the City. There has never been an officer assigned there for traffic duty.

Q. What is the officer called there for, or why do you ask that he be sent there?

A. As a safety first with our money, with our remittances, to protect our property from robbery.

Mr. Hall:

Q. Mr. Bowen referred to the fact that the conductor of the street car when it comes to the crossing gets out, but in a very perfunctory way, sometimes without waiting for the car to stop, signals the car to cross the track. Have you ever known of the City officials undertaking to enforce the City ordinance with reference to the duties of street car conductors in crossing the tracks by having cars brought to a stop the distance of 10 or 15 feet from the track, and then the conductor going forward to the track and looking both ways and giving the signal after having made that observation? Have you ever known of the City making any effort to have that ordinance enforced?

A. It never came to my knowledge.

L. D. McPHERSON, being duly sworn, testified as follows:

Direct examination by Mr. Hall:

I live in Chicago, Illinois. I am Terminal Land Appraiser of the [fol. 544] Chicago, Milwaukee & St. Paul Railway; have been engaged in that work since August 1, 1920.

Prior to that I was Senior Land Appraiser for the Bureau of Valuation of the Interstate Commerce Commission; engaged for seventy-five months prior to that in the federal valuation of railroad lands, assigned to the southern district, which covered the states from the lakes to the gulf, east of the Mississippi River.

Q. What had been your occupation prior to engaging in that valuation work for the Interstate Commerce Commission?

A. I was assistant right-of-way agent for the Southern Railway for two years; I was sole right-of-way agent for the Southern Railway System for five years. I am 45 years of age. Graduate of Hamilton College. I am a lawyer by training and of some years' experience.

Q. What was the exact purpose of your service with the Interstate Commerce Commission?

A. To appraise and report the value of real estate rights of way and terminals owned by the interstate carriers.

The method by which we ascertained values was to search public records for recent sales of adjoining and adjacent similar private property as a means of establishing market value for the territory contiguous to or abutting railway properties from block to block and farm to farm, whether in city or rural lands, and having accumulated the sales over a recent period, say arbitrarily 5 years' period to date at which the inventory of railroad holdings had to be completed, making a study of those market transactions of comparable property [fol. 545] erty; we also examined records and collected and analyzed leases of this private, contiguous property; also consulted and interviewed parties who sold or bought or leased land or had land for sale, or management of property; we canvassed rather diligently all sources of information that was promising of yielding some suggestion as to ruling market price with a view to applying these; in that way we amassed, studied and analyzed data collected which we converted to unit prices per front foot, square foot or acre, platting results on maps along the railroad in figures and units, and from that collection and display of information gathered, having first carefully inspected and studied, even photographing territories, attaching photographs of adjacent property as exhibits to the report deriving value for that railroad land by our method of interpretation and adaptation.

During the last four and a quarter years in which I was solely on appraisal of lands in major terminals, during that part of it there was about four thousand parcels in Atlanta, Georgia; twelve hundred to fifteen hundred in Jacksonville, Florida; forty-one hundred in Indianapolis, and about four thousand in Cleveland, Ohio. Prior to that, for two years, I would think I examined perhaps three hundred parcels a month.

Q. When you speak of "ownerships," in many instances would include more than one lot?

A. Yes, that would merely apply to the number of original survey units of allotment of property, whether by government survey or subdivision. The number of ownerships would perhaps not be more than the number of original survey units involved in the study. I [fol. 546] was engaged in the examination of the four thousand ownerships at Cleveland about eighteen months. That included valuation of property adjacent to all of the railroads in Cleveland.

Q. That included all properties adjacent to both depressed and elevated tracks?

A. Yes, sir; it is a town of irregular topography; one of the most complicated I ever worked in. I am familiar with the subject of topography. There are a number of depressed tracks in Cleveland.

Q. From your observation there, what would you say was the prevailing cause or reason for depression of tracks in Cleveland?

A. Line of least resistance, speaking in terms of physics, was along water grades or levees of such streams as entered Lake Erie, or which were tributary to the Cuyahoga River, two strong tributaries to the river, one known as Woolworth Run and Kingsbury, streams of considerable volume, they come through deep gorges or glacial passages, they cut great gorges, and much of the railroad yards and almost a prevailing right-of-way entrances, from a civil engineer's standpoint, seems to have been followed down stream into the city, resulting in much of the railroad facilities being very much below the elevation of the city proper.

Q. In short, it was due to topography only?

A. Yes, solely.

Q. Will you state in your investigation of a piece of property that was adjacent to a railroad track which you were valuing, the nature of the inquiry that you would make of the property owner?

A. The property was first inspected; we got a full supply of railroad maps showing tracks, right of way, property lines of rail- [fol. 547] road property and blocks adjoining the railroad, terminal property primarily; we would go over the line with those maps and mark on them just what the character of occupancy of adjoining property was; simply mark on map in this blank if it is predominatingly residential, mark that residential; indicate class of property, poor, medium, good, classifying adjoining territory, whether apartment, industrial, warehousing, retail, office buildings, hotels. We took those maps to public records and public maps, and gathered all sales occurring within a period of say five years prior to date we needed to fix the value. We interviewed those people.

Q. What did you find was the expression of opinion from owners of property adjoining the railroad in cases where tracks were depressed along their property, as to the effect of that depression upon their adjoining property?

A. In the main it was injurious to the property and retarded advancement in the use and value of the property.

Q. What was the basis of their complaint, or the reasons for which they gave that opinion?

A. It is nuisances that arise from the operation of rolling stock and trains over the road; mainly the locomotives, soot, smoke, vibrations with heavy locomotives in the cut and, chiefly, begriming of property from the discharges from locomotives.

Q. What was your observation with reference to property that was adjacent to railroad tracks that were on an elevation?

A. The begriming of property was less marked and slower than in the case of depression, and the defacing of property and injuring it for most uses; of course, that injury as to the manufacturing [fol. 548] property is not the same as it is to residential property.

There is not a great deal of difference as to the noise and vibration; I don't know that there is a very marked increase in the cuts, though that all depends on the grade in which the train is operating, whether engines are operating under high pressure and with heavy exhausts and vibrations; the grade is more of determining than than the depression or elevation, I think. I appraised all the property on all these railroads in Cleveland. My investigations took me to property adjacent to all these elevated and depressed tracks in Cleveland.

Q. I hand you this picture which has been identified as Wabash Exhibit 10, being the Carlvon Road looking southerly from 400 feet northerly of the railroad; did you make the valuation of that place?

A. Yes, sir. I also made the valuation in location on picture marked "Wabash Exhibit 14."

In my opinion, from my investigation adjacent to the railroad elevation at the places shown in those two pictures, the property was not depreciated by reason of the elevation of those tracks at that point. That opinion is the result of investigations made by me.

Wabash Exhibit 18, showing Broadway street over the New York Central in Cleveland shown to witness.

Q. State what, in your opinion, was the effect of the depression of that track on the adjoining property in that locality.

A. Property adjoining that location had no activity, no development, and appeared to have been killed by something. I wouldn't state what it was the cheapest property we found in Cleveland, around that depressed track.

[fol. 549] Q. What was your observation with reference to development of property adjacent to elevated tracks as compared to the property adjacent to depressed tracks? The elevation didn't arrest the future of the property or retard it anything like to an equal amount as did the depression generally from city to city and under all conditions.

Q. What was your observation with reference to the condition of property adjoining the viaducts in the streets that were thrown across the railroad tracks where there was a street elevation over the tracks?

A. Wherever a grade separation is accomplished by elevating streets and reaching the elevation with long ramps from the grade of the street, the long ramps naturally cut off the frontage of the property abutting on the street; either that or they necessitate an uneconomical development of the property in most instances by

building up to the street and leaving that part of the structure below the level of the viaduct with a low front; it has no retail possibilities except from the floor above, and all that structure necessary to bring it up to the elevation of the viaduct is largely wasted and non-productive as so many bricks laid up above the level of the street. I appraised property adjacent to elevations in the street where there were residences at the south.

Q. What did you observe there with reference to whether the residences were brought up to the street level or left down at the former level?

A. The level residence is too cheap a structure to justify revamping to meet new conditions, considering the value and productiveness of it in the location as changed after revamping. The result has been that property is largely vacant long before its structural service-[fol. 550] ability is subsided. I have made a personal examination of property adjacent to the Wabash Railroad from Delmar avenue, as far as Kingshighway.

Q. What, in your opinion, would be the effect upon the property adjacent to the railroad right of way in the event that the tracks should be elevated from Delmar to Kingshighway?

A. As against the present grade level there would be some advantage in some respects to have it on an elevated rather than remaining as it is; the property would be, in a measure, the whole district would be benefited by that elevation as against remaining as it is. I do not think there would be any marked depreciation in the value of property in that vicinity by reason of the elevation.

If the tracks were depressed into a cut running in places to a depth of 22 feet I can't see that it could be benefited; the whole effect would be to injure the property. That opinion is based on only what I have seen in other locations similar to this and a study of property values. I did not consult any property owners in St. Louis.

Mr. Hall:

Q. Did you make any observations of property along the Rock Island Railroad from De Baliviere west?

A. No; my observation was along the Wabash entirely. I recall the point on De Baliviere where the Rock Island tracks separate from the Wabash; the Rock Island tracks continue west and the Wabash going to the northwest.

Q. From your general observation have you any reason to believe there would be any difficulty with reference to property adjacent to the Rock Island tracks west of De Baliviere from what you have [fol. 551] described, as to property adjacent to the Wabash?

A. None whatever. The conditions would hold good; the same laws of effect and value would apply.

Cross-examination by Mr. Senti:

I stated that in Cleveland one of the sources of complaint by the people adjacent to the subway was smoke and grime.

Q. Do you have similar complaints voiced to you by people whose property is adjacent to tracks which have been elevated?

A. None. I am of the opinion that the tracks being elevated, the smoke and grime would perhaps travel farther, but it would be mingled with the atmosphere to such an extent that its identity would be lost after the abutting property had been passed. The tendency was that the diffusion was more rapid in elevations than when lower. I didn't get any complaints at all to smoke and grime.

In the observation of property you didn't have to wait for complaint; it was written all over the adjoining buildings and property and you could tell without having been down below.

Q. As a matter of fact, your impressions came from your observation, not from the property?

A. Both ways. They came from property owners and from myself, too. A man appraising must take information from people who have experience in the district. My statements are not controlled by impressions I got from property owners; it was substantially affected by the community.

On the railroads I have appraised to date I think there is every class of property in use that I have ever heard of. I think I have met and examined every kind of property.

[fol. 552] Q. What character of property predominated?

A. There is a tendency for people to assemble; people who generally take locations by selection usually select a residential territory away from the railroad; very few people select it. There are cheaper and lower class residence property found along a railroad terminal than in a better district, there is no universal rule. There is always a substantial occupancy of the railroad frontage in every city, but what you call the substantial and better class, the de luxe, if you will allow the term, are usually found in other sections, but some very handsome homes are found in sections contiguous to railroads. There has been some new property built up there, but the rule is the other way; the more select homes seek other environments than the operation of steam trains. As a result of that rule there is more falling to other uses than to select residences; the percentage won't be great.

Q. I believe you stated you had made some personal examination along the Wabash Railway between Delmar and Kings-highway. Did you have in mind the exact changes that were proposed to be made by the City?

A. Yes; I visualized the best I could from a careful study of the profile; I have been used to working with them. I think I could see in my mind's eye what the situation would be under both projects, this depression and elevation, not only as affects the roadbed itself, but as it affects the street crossings and the general surroundings.

Mr. Rodehaver:

Q. Are you familiar with the general outline of the terminal situation in St. Louis?

A. I have made rather a serious study of it for the last 18 months [fol. 553] or two years. I have been trying to inform myself as

thoroughly as possible of these conditions in every city; I only know in a general way and not about the details of the terminal situation.

Q. You said the depression of tracks tended to retard improvement and elevation to improve property. Wasn't that your statement?

A. I think that was substantially it and what I meant to say.

I am not familiar with the Cupples Block in St. Louis where the trains come out of the tunnel and enter Mill Creek Valley.

Q. Are you familiar with the class of structures along the levee on the elevated approach of the Merchants Bridge?

A. I have seen that property but I am not familiar enough with it to go into detail.

Mr. Bowen:

Q. In determining whether a particular piece of property is damaged or benefited by carrying out of a piece of construction, isn't that damage or benefit usually measured by the difference in market value of the property before and after the improvement?

A. The Supreme Court of Tennessee ruled that was not the measure of damages and it is a farcical answer.

Q. In the property in Cleveland about which you testified, did you make your appraisal before these changes in grade were made or did you make your appraisal subsequent to the changes in grade?

A. Appraisal was made as of a definite date. The study involved market values before and after, especially this depression on the Nickel Plate on the west end of the town, as the whole project was in process and not wholly in 1918. We examined the market value of property of 1914 and 1915 and up to 1919. The situation was [fol. 554] being looked over when we went there to investigate and the cut was largely made and bridges, most of them, were in. The streets were carried over the temporary bridges and my recollection is that the ramps were in and the sale of additional lots required in order to acquire the easement for the ramps up to new elevation to cross over where the depression of the tracks was not quite sufficient to produce a clearance of 22 feet.

We made our appraisal in July, 1920; the actual fixing of our value was delayed; we were developing our valuation in July, 1920, and the work had been done; I was there 18 months and when I went there the cut was already made and most of the bridges were already over, but some were not. I could only answer that far.

Q. At the time you were there in 1920 wasn't the work rough and incomplete; the slopes of the cut not graded; the bridges without handrails and some of them not constructed at all, only temporary bridges in place?

A. That is substantially true as to the main point you mentioned there was no final dressing up of the work; pumps were down in the cuts pumping them dry and I believe were drying in some of those cuts. I know there was some foundation work or some little construction work done. The roadway was ballasted and trains had been operating at that time. When we were there during the 18 months it looked like a permanent road, but it could have been

finished and dressed completely since I was there; I saw all the bridges and work. I think there was no crossing to be eliminated.

Mr. Hall:

Q. What was your observation with reference to the appearance of [fol. 555] a railroad on an embankment or elevation as compared with a railroad in a cut, as to the sightliness and manner in which it was kept and the accumulation of refuse and trash and things that would be distasteful and objectionable?

A. We are appraising in Chicago the C. M. & St. P. terminals, a large portion of which are elevated, that is a very sightly and attractive structure. Along the elevated roadway through the North Shore is the Goldcoast, the California and apartment houses and hotels are going up along the line and new apartments are being built where you could toss a ball over the top of the track where the trains run and nothing is unsightly in appearance. Property at least \$16 a square foot up towards \$2,000,000 per acre right along beside that stuff in Chicago. We appraised property which leases for \$59 a square foot and there are about three solid miles of hotels and houses against elevated structures, not more than a 15-foot alley between the buildings and the elevated structure.

Buildings now being erected will run in the neighborhood of \$300,000; land is worth \$175 per front foot for three or four miles. That is not counting Evanston, which is the same proposition. There is almost a uniform land value of double what it was 12 years ago before the elevation was put in; that condition exists for three or four miles from Howard avenue; then there is a big cemetery there and it breaks out again and goes through the town of Evanston.

I have lived in those apartments with trains passing at all times of the night and there is nothing objectionable about it. I have lived [fol. 556] contiguous to elevated structures in Cleveland and if the grade is already where the engine don't have to stall and can operate without going under high pressure, it is more desirable, from my personal taste, to be around an elevated structure than where the smoke comes up onto and into the house; that is a ghastly sight to me.

Q. From your personal experience in living there adjacent to an elevated railroad, did you ever feel that your sense of modesty or exclusiveness was shocked or infringed upon by passengers from the trains gazing in at your windows as the trains went by? That seems to have been a source of great apprehension on the part of apartment owners whose property was 100 feet or more away from proposed elevation?

A. Practically all elevated railroads in Chicago have buildings running back with the kitchens and bathrooms and other structures to within 12 to 40 feet of them. There are miles and miles on the south side; the Oak Park lines, the Jackson Park lines; the Kenyon, I believe it is going over toward Hyde Park district along the Illinois Central, the Carlton Hotel—those territories are all up against or close to elevations. In Chicago nothing is thought of an elevated structure passing an apartment; the closer it is, the

easier the transportation to get down to town and the better you like it.

I have never noticed inconvenience from headlights of trains shining in windows from trains running on elevations.

[fol. 557] CHARLES A. HALL, being duly sworn, testified as follows:

Cross-examination by Mr. Brown:

I am a land appraiser employed by the Wabash Railroad since July 1, this year. Prior to that engaged in land appraisement for the Interstate Commerce Commission of the United States Government for 40 months. Prior to that I was with the Central Georgia Railway located at Savannah, Georgia. I was connected with the Land Department for the first few years of my service with them and later with the Valuation Department. I am 36 years old. I have been in touch with land matters since 1909.

I was associated with Mr. McPherson in his work which he has fully described; that is our method of procedure; it was joint work and equally shared between us, both of us carrying on practically the same kind of work and until August, 1920, Mr. McPherson had charge of the work; after that time he went to the St. Paul Railway, I completed the carriers' lines in Cleveland.

Q. During what period of time did you carry on the valuation of the work in Cleveland?

A. I was there the entire time of the valuation at Cleveland from February, 1919, until February this year, 1921, 23 months on the work in that city for the entire completion of the roads there.

My work in Cleveland involved a valuation of property adjacent to railroads which were located in depressions, the majority of cases as I recollect were elevations.

[fol. 558] My opinion as to the effect upon the value of property adjacent to a railroad built upon an elevation is if it is not on the elevation, it is not hurt that I can see. That is based upon my examination made in Cleveland.

Q. What is your opinion as to the effect upon the value of property adjacent to railroads located in a depression?

A. I don't believe that is looked upon as good as the other, although my experience and investigation has not been as thorough in the depression property adjoining as it has in the other. I know we find cases as shown in this picture which was called to Mr. McPherson's attention. That is Exhibit 18. I know that that property was very greatly depreciated by a cut as shown in the picture, but I can't substantiate my testimony with as many examples of depression as I can with elevation, because it doesn't seem like there happen to be as many. There were at least two to one as many elevations as depressions in Cleveland.

I recall these Exhibits 10 and 14, as showing the character of the property which I appraised; I have gone over those on foot quite a few times, and have talked to people in the neighborhood.

Q. State if from your personal conversation with those people owning the property shown in those photographs, you found that their property had been depreciated in value by reason of the elevation of tracks along there?

A. I want to modify that a little. We, in working a terminal of this size, have more than one man working on it. I may not have interviewed every man, but some one of our party and I went over all the ground.

[fol. 559] From my investigation and examination made under my supervision, I do not think the property has been hurt and the vacant lots near there are selling and it is building up with the same class of apartments that are there.

I have not observed that property adjacent to the railroad elevations was of inferior character than that which was there prior to the elevations; the same class of residences have been following into the vacant property that adjoins it.

Q. What was your observation with reference to the development of property adjacent to depressions such as that photograph, Exhibit 18, shows?

A. In that particular case the property was greatly damaged; that is not a high-class residential neighborhood, and the property was on the market a good deal and there didn't seem to be much demand for it. I have had experience in the valuation of business property adjacent to railroad elevations. I have run into that in more than one city.

Q. What was your observations there as to the effect of an elevation upon your business property?

A. It has not hurt it a bit; I have seen some very fine business locations right against the abutment of overhead structures.

At Sixty-sixth and Euclid avenue, in Cleveland, we find a value between \$8 and \$10 a square foot right against the abutments of the Pennsylvania Railroad; that is business property. In Richmond, Virginia, I valued property under the elevation of Main street there at \$4 a square foot; there are clothing stores and such as that there. That was located right under the tracks; that is, between the bridge construction instead of solid embankment; it [fol. 560] wasn't built solidly. Those were land values with improvements taken out.

Q. Have you had under your supervision the value of Wabash property north of Delmar? Since you came with the Wabash?

A. Yes, sir.

Q. Have you had any specific instance called to your attention as to the effect upon property adjacent to the Wabash where the tracks were operated through a cut?

A. Yes, we were investigating a sale adjacent to the Wabash Railway, and interviewing the owner at the time. That was north of Delmar outside the city limits. The lady said she had been trying to sell the property for two or three years on account of the location of the site, where the Wabash crosses under; that she had prospective purchasers there on two occasions and the Wabash train

had come through and thrown up a lot of smoke and cinders in her yard and the people went away without considering her property? She says she finally did sell it, but if it had not been for that grime and stuff coming from the railroad, she thought she could have gotten \$1,000 an acre more for it. She said the effect of smoke and soot coming from the trains operated in the cut disgusted the people looking at the property and they didn't want to consider it further.

Cross-examination by Mr. Senti:

Q. As a matter of fact, that lady's objection was to the railroad itself and not the fact it was depressed?

A. It was the effect of being depressed.

[fol. 561] Q. Did she specifically tell you that, or of the presence of the railroad there?

A. It was the effect of that smoke being thrown up.

Q. Did she complain of the presence of the railroad or the depression?

A. She didn't state in those terms.

Q. She didn't say anything about the objection because of the railroad being depressed?

A. I won't say that she did.

Q. You testified in reference to this property adjacent to the cut shown by Exhibit 18. Do you know whether the buildings shown on the picture were erected prior to the cut being placed there or not?

A. Yes, sir; the character of the particular building on there was then fixed before the depression was put there. I don't think I paid any particular attention to the depth of the depression at this point.

Q. About how deep would you say the depression is there?

A. It would be merely a guess; I think it must be 30 feet there. I couldn't state whether a depression of that depth would be considerably different from a depression of only 18 feet. I wouldn't undertake to say it made a difference.

Q. If you were sent out to make an appraisal by the Interstate Commerce Commission you wouldn't take into consideration whether the cut was 18 feet or 30 feet?

A. I would appraise the property according to instructions arriving at the best value under the instructions.

Q. What are your instructions?

A. They were issued to us in large pamphlet form and it would take me half a day to read them. I would observe them to the best of my ability.

I spoke of some buildings of very high class being erected adjacent to elevated structures beside the buildings erected subsequent have been of the same character of those placed there prior.

Q. Have you any means of knowing that similar structures would not have been erected had the tracks been depressed instead of elevated?

A. No, sir.

Mr. Hall:

Q. What is your observation in making valuations as you went back and forth adjacent to the cuts in Cleveland and other cities with reference to the effect that the smoke from passing trains actually had upon the property adjacent or adjoining?

A. That the smoke coming out of the cut often rises up around the houses adjoining the property. Smoke emitted from engines on elevations rarely ever drop; it generally floats on about a level or rises.

From a point in the air it will be carried away more quickly.

Mr. Senti:

Q. You spoke of smoke on an elevation where the elevated tracks passed adjacent to these apartments that are located at a close proximity to the track; if the upper stories of the buildings were about even with the railroad, they would be subjected to just about the same amount of smoke that property on the first floor would have been when adjacent to a tunnel?

A. Only fourth or fifth floors, whatever you have will be subjected to that smoke. These elevations were sometimes near the upper stories.

Mr. Bowen:

Q. You speak of soot and cinders being thrown on this woman's property; do cinders also fall to the ground or are they dissipated in the atmosphere?

A. After a certain time they come down.

Q. They come down whether they are sent up from an embankment or from a cut?

A. Yes.

Q. Soot, unconsumed coal, does it fall toward the ground or is it [fol. 563] dissipated and carried away in the atmosphere?

A. It comes to the ground in time in one way or another, but it will float in the atmosphere and scatter.

Q. The difference would be, if sent out from a higher elevation, it would scatter further than if sent out from a lower elevation?

A. Yes, sir.

Q. The Wabash runs in a cut between that point and Ferguson; it runs in several other cuts, does it not?

A. I have been over the line, but I really have to refresh my memory. I think there are other cuts between there and Ferguson.

Q. Do you recall the cut near Alderney station?

A. I don't recall the name.

Q. You don't recall the cut about 56 feet deep in there about a mile long?

A. I can't recall.

Mr. Rodehaver:

Q. In your investigation, have you had any occasion to find out anything about the property from Delmar east as far as Laurel where the trains run through the cut?

A. We have gathered sales information on all of that property at this time but not all has been investigated.

I have noticed property along the levee front in St. Louis. That is not high class improved property along the elevated track, but I will tell the reason why. In the first place that is not trackage property and in the second place it is on a lower shelf; the grade is almost prohibitive to get out of and that is the reason it has not been improved.

The property from Seventh street to the levee front is not trackage property.

Q. Do you think the elevated structure has improved that property?

A. That elevated structure is not to work in with that class of [fol. 564] property; it is not trackage property; it is industrial and storage property.

Q. Is the property north of Forest Park trackage property?

A. No, sir; not between Forest Park and Delmar.

Mr. Brown: We have reached a point in the case where I assume the Commission will desire to know what the Wabash proposes by way of plans, etc., and the Wabash and the Rock Island are prepared with plans to introduce here, showing the method of treatment of grade separation of that work, should it be required. In introducing these plans, so far as the Wabash, and I understand, the Rock Island is concerned, we take the position that we don't wish to be understood as departing from our position set up in our answer, that there is no necessity for the separation of these grade crossings, and we wish the record to show that in introducing these plans it is not to be understood that we are proposing the work of grade separation by the elevation plan, but it seems to us that it is necessary to have that method brought before the Commission by proper plans in order that the Commission may have the information, but we do not wish to be prejudiced by that.

(Wabash Exhibit No. 27 and Rock Island Exhibit No. 1 are marked and filed.)

R. H. FORD, being duly sworn, testified as follows:

Direct examination by Mr. Burns:

I am 52 years old; I reside in Chicago; I am assistant chief engineer of the Rock Island Lines.

[fol. 565] Q. Please state to the Commission your experience in railroad work, general experience, graduation from what school and give an outline of your previous history in connection with railroad work and as an engineer.

A. I am a graduate of the engineering course of Norwich University in Vermont; I was for a number of years in charge of general railway construction work of the D. & H.; I had to do for about 13 years with grade separations in Massachusetts, Connecticut, New York State, and to some extent in Vermont. Later I was in general charge of construction and maintenance on the Missouri Pacific Lines and still later as engineer of track elevations, grade separations for the Rock Island Lines, later in charge of construction of the Rock Island Lines; at present I am in general charge of engineering and construction of the Rock Island System.

The work in Massachusetts, especially, covered a very wide range of track and grade separation. In Chicago I designed and built the largest piece of track elevation in the city, with the possible exception of the Grand crossing case. In that period of time I have had to do with a great many pieces of grade crossing construction. I have been consulted on a great many more. I had actual charge of designing and constructing work of this kind and in maintenance after the work. I looked after the actual as well as the theoretical work.

In the general railway work excluding about two years as chief engineer of a big construction company I have had about 25 years' experience in these different lines of work.

Q. Are you also connected, or have you been, with any civic bodies of any kind?

[fol. 566] A. Yes; I am a member of a number of organizations having to do with civic improvements.

Q. State in your own way what are some of the fundamental principles which determine the proper method for separating grades between highways and railroads?

A. As an engineer all problems of this character carry with them certain well-defined fundamentals which have to be considered, or should be, if the problem of grade separation can be intelligently undertaken.

I will allude to them, not in their special order, but as being factors:

The first deals with the profile of grades, both for railways and streets, which will result after separation. These must be arranged so they can be successfully and economically operated. The predominating feature, of course, being the railway grades on account of their greater difficulty in operation.

Second, drainage. This must be simple and adequate. Special study being given to the soil, to the topography and subsurface conditions. Railway operation demands a more simple and more adequate treatment than is possible for an isolated section like a city or factory, where increased supervision is always present.

Third, cost should be commensurate with the necessity and ability of the affected interests to pay.

Fourth, is the maintenance after completion. The work should be so designed and constructed that these will be as low as practicable.

Fifth, safety and convenience, both to railways and the traveling public, work being so designed or built as not to violate either of these principles.

[fol. 567] Sixth, damage to adjacent property. This is always a secondary consideration because of the relative unimportance of the individual to the public good.

Seventh, future development. Work should be so arranged as not to arrest or unduly affect future expansion.

Those are what we generally refer to as the seven principles of grade separation.

I am familiar with the proposed plan of the City of St. Louis involving the separation of grades at Delmar between the Wabash and the street, the consequent future separation of grades south of Delmar which would necessitate placing the track in an excavation or cut. I have made a study of the general features, but not the detailed plans. The general features are sufficient for the purpose. I lived in St. Louis a good many years and am familiar with the general location. I have also been over it a good many times, not only since this hearing, but because of the fact that it was a pending question for some years past. The general problem now is in applying the principles which I outlined and which I do not want to be understood as saying are the only ones, but they are indicative of the principal ones and I will take them up in their order.

The profile of the roads is far worse than they are at present. The profile of the streets by the City's plan would lend itself, then, to elevation because the profile of the roads can be improved and to a more or less extent than the profile of the street can be.

Q. To simplify the record, refer to these plats on the wall as Wabash No. 27 and Rock Island No. 1, taking into consideration the [fol. 568] plan of the City of St. Louis as you have studied it and the proposed plans show in the profile, I wish you would give the Commission fully and in detail the application of the special problem involved in the St. Louis situation with the principles you have spoken of as applying in general to grade separations.

A. Taking the so-called City plan, which is indicated on Wabash Exhibit 27, the lower line shown in black being the profile grade of the railroad as indicated by the City depression plan, the red line on same exhibit showing the rail by elevation plan as indicated by the railway, the grade of the City's plan would introduce a long eight-tenths grade, which would be a ruling grade as compared with a shorter grade of about six-tenths. The grade in question is a ruling grade because of its length; added to that is the fact of the location in a depression which makes a relative addition to a rate of grade by reason of the wet, damp rail and poorer maintenance conditions.

The red line is less than a two-tenths grade, being elevated to the weather, and gives a relatively decreased grade, so that the first fundamental is very much in favor of an elevated plan.

The drainage on the City's plan is a very deep depression. Ground water level is above the lower portions of the grade of the track according to the City plan. This of itself must keep the track wet or at least it must be damp and increases immeasurably the distance and disadvantages of drainage. I want to say in connection with that, irrespective of whether the sewers would take care of that, under normal conditions it is the abnormal conditions that a rail-

road has to look for and that a maintenance engineer must have in mind.

[fol. 569] Under the red line there would be no necessity of any drainage at all, the tracks being elevated and free from any difficulties or interference and any question of floods, heavy rains are entirely lost sight of and are not a factor in the two features. The drainage of foundations can be taken care of by the usual method of draining in the surrounding sewers or provision of that kind.

The cost of the City's plan will be very greatly in excess of what it would be by the elevated plan. Maintenance will be greatly in excess by the depressed plan over the elevated plan.

Convenience to the rails is met in a far greater degree by an elevated structure than a depressed one. In our work in Chicago there has been a very noticeable decrease in pilfering by our actual record in our claim department where we have elevated our tracks.

The safety of the traveling public is accentuated in an elevated structure over a depressed or even a grade structure. The ability to maintain is in favor of an elevated line.

The depressed structure introduces, first of all, an element of opportunity for trespassers in and around the right of way which are absent in an elevated, making the latter more favorable.

It has been our experience in Chicago, and I speak of that particularly — account of its being a large city, that damage to adjacent property is about three-tenths of one per cent on an elevation. I have no comparisons to make direct with depression because conditions of Chicago, being on a prairie, do not lend readily to track depression. My experience in eastern cities is that there is an increase rather than a decrease in the depression.

[fol. 570] The plan indicated by the City would arrest, if not effectually paralyze, future development of the Wabash by the depression plan, whereas, by the elevated plan it would not.

The same is true of the Rock Island plan. Speaking from the standpoint of an engineer, I don't know when I have seen a location so fascinating from an elevation standpoint as the Forest Park-Delmar territory, which the City has in contemplation to separate the grades. It is an ideal elevation plan.

The question of design is one that will fit itself in very easily, speaking from the standpoint of an engineer. That is not a major question; one that is somewhat secondary because of the great importance to the public good of the line of railway through the country which it passes.

Q. Taking the Rock Island plan, shown on Rock Island Exhibit 1, made up of a continuation of the Wabash plan, the first half being the location from Kingshighway to De Baliviere, and a new situation shown by joining the railway west to Pennsylvania, state the objectionable features of the situation so far as the Rock Island is concerned.

The objectionable feature is the first issue, the grades. The City's plan would depress the railway into a cut, both sides of the River Des Peres, and if we assume first of all a passenger train of ten cars placed so it would reach one side of the grade of the River Des Peres,

and on the other it would mean there would be a continual pull and haul of trains passing over the grade, making it very objectionable from an operating standpoint, very expensive to maintain and one [fol. 571] that was almost unthinkable from standpoint of practical railway operation. After that grade is left, we approach a long ascending grade in excess of 1 per cent. There is no opportunity for momentum and the result is we have a long, steady, upward climb.

The grades of the Rock Island, as they exist, are made up of a series of momentum grades until we reach over the hill at Clayton. There has been more or less said about the rate of the Rock Island grade as being excessive, or in excess of the grades proposed by the City's plan; I think they overlooked the fact that in the construction as proposed by the City's plan, it is perpetual, whereas the grade on the railway there, or elsewhere, is a momentum grade susceptible to reduction. At times there are stops at Clayton on the Rock Island on a very adverse and unsatisfactory grade, but this is relative as compared with the amount of money necessary to improve it.

The Rock Island business has increased 33 per cent, west bound from St. Louis, in the last two years, freight and passenger business, and the question of efficiency of operation makes it necessary for us to look very seriously on anything that increases our costs of operation out of St. Louis. The Rock Island connects at De Baliviere with the Wabash. They have a right here, and it would hardly seem that as a practical engineering matter in view of increasing traffic, objection should be made to any obstruction methods of construction introduced in its grade line when the reverse, if anything, ought to be the case.

The grades as indicated by elevated line have their purpose, and [fol. 572] considering if the time has come to improve its property, the grade is such as is consistent with good policy, and the policy of the company itself is grade reduction. The Rock Island lines do not exceed five-tenths in its grade improvement work, and I think it is generally accepted through the country that the limit between three and five-tenths is considered as a grade reduction, all things considered, if they are going to spend great sums for improvement in such cases.

The topography of that vicinity lends itself absolutely to the upper grade line; there is no difficulty in securing a proper and efficient grade line. In fact, on account of the broken country in and around St. Louis, it is unthinkable that anything but track elevation would be put upon a railway spending a vast sum, and I am speaking of the question as it concerns a common carrier and in the public interest. The situation there, in my judgment, is adverse to lowering of grades. I would consider it most reprehensive from an engineering standpoint.

Q. As I understand it, as the situation shows here, that the separation of grades at Delmar by raising the streets, necessarily fixes and makes further separations, resort to the depression plan. State whether or not that is bad engineering to force that kind of a situation?

A. I would consider it very bad engineering. Regarding the

aesthetic development, there is no difficulty at all in treating it at Forest Park and its approach so as to fit into the topography of the surrounding territory, on account of the broken country, the parking effect would doubtless occur on any problem of this kind through Forest Park. Treatment of the structures is purely local and can [fol. 573] be developed in any way; it may be made ornamental or the reverse.

It has been my experience that opinions differ largely; one group will require that the structures be unobtrusive and fit in so as not to mar the general landscape, leaving the glen or trees to predominate; another will feel that an ornate bridge is ample treatment. It is entirely practical to fit the structures, whether in terracing of the fills or treatment of bridges over the streets into the surroundings. It is a matter of personal judgment and opinion of the locality in which the work is done. An elevation lends itself entirely to treatment of that kind.

Q. Reference has been made to the unsightly work in the vicinity of Chicago, Exhibits 113 or 123 showing pictures of bridges, etc.; state in a general way, in view of your familiarity and connection with Chicago grade separations, what observations you have made?

A. I looked over those pictures after they were in evidence; in all cases they represent types of older construction. I recognize them to be what we call tin bridges, which we are taking out; we don't build that type any more; it was forced on the railway because of insistence of the City at that time for a complete span over the entire street. Since then those features have been thoroughly understood by cities and by putting in center supports to the curb line it has permitted a different type of construction. In Chicago we use the slab type now where there is no noise and it makes a continuous roadway structure over the street and we have been commended a great many times by residents and the City themselves on our class [fol. 574] of construction. However, the Rock Island, New York Central, the Wabash and Grand Trunk and Western Indiana approach the City from the South and the residence district of Chicago is on the north, except along the lake front where the Illinois Central approaches, it will be found by a study of the surrounding territory and by the structures that have gone up, that they are pretty largely in harmony with the type of development. In the business section structures are left, as a rule, of steel, and in the residential section they have gone to a more ornate type. The Rock Island adopted the mission type of design and challenge anybody as to the beauty of some of our newer structures.

I think the situation in St. Louis different from that in Chicago in this respect: Forest Park is a very beautiful territory and any elevation through there should lend itself to the surroundings and it is very possible and practical to make a very beautiful structure there, not necessarily expensive, a beautiful setting for tracks going through Forest Park. It would be unfortunate to take in the great number of people that must pass in and out of St. Louis in a cut where they have no opportunity to see the beauties of Forest Park. The time will come if the track elevation ultimately goes through

there, when the setting will be in harmony with the surroundings, just as present structure over Grand Drive is known over the country as being very beautiful.

In a general way the bridges at St. Louis over tracks in Mill Creek Valley and the viaducts, the problem for track elevation through Forest Park and out through Delmar is different; the setting is different; a viaduct such as has been alluded to [fol. 575] as crossing the Mill Creek Valley is not indicative of what a viaduct would be through the residential section of St. Louis.

Chicago had a period of viaduct construction and nobody could ever get a viaduct in Chicago now if possible to eliminate it. A direct comparison with Chicago is hardly fair because of the difference in topography, Chicago being flat and St. Louis broken. Cleveland is a good example; Pittsburgh, New York, Philadelphia, North Philadelphia, Baltimore, all of which I am very familiar with, are evidences of artistic treatment both by combining elevations and depressions as the circumstances may warrant, but I want to make it plain that in no case I have cited has there been no consideration to the question of the profile of the railroad; the profile of the railroad in every case I have cited that has reached my experience is one of the major problems that must be considered in carrying out any problem that calls for grade separation by the profile.

I heard the testimony of Mr. Hayes of Boston; he alluded to rise and fall and I used that as a comparison of the value of one line over the other, the purpose being to make a comparison between a depressed and an elevated line. A rise and fall is used in railway construction, its purpose being to take projected lines and compare them one with the other. Speaking from the standpoint of a construction engineer, we technically build one line on paper and we build another by routes; we use this as a measure to compare one with the other on grades. There are four accepted or generally used methods: Berry, my former chief engineer; Wellington, who [fol. 576] was used by Mr. Hayes; Crocker and Professor Raymond. The difference in these will vary from 1 to 200 per cent. They are purely theoretical and their usefulness is taken when one is used by direct comparison with other routes and the error of course being the same all through is not serious in its comparisons of routes, but it is never used for comparing operating lines, for the reason that judgment and experience indicates what the train can do. The common accepted practice is to use a dynamometer car to get the draw bar pull of the experience of the operating man as to what a train will do over a grade.

Those practical observations are taken instead of a theoretical rise and fall absolutely; in passing on that in our grade reduction problem which we always have, we use the comparisons on similar operated sections as an index of what would be accomplished by the question under discussion.

I have here the relative costs of the two projects the details of which have been made by our engineers. On the Wabash plan indicated here, the track depression by the City's plan will be about \$1,100,000.

Commissioner Bean:

Q. Do you refer to the Delmar avenue?

A. No, not to the whole property.

Track elevation plan will be about \$2,340,000 or an excess of \$1,736,000 in favor of track elevation. The excess cost, assuming both methods are practicable, would permit the separation of about 700 additional crossings in Missouri, that the City would want to have buried in this particular job in order to get their scheme of track depression.

The Rock Island portion, estimate covering that portion as indicated [fol. 577] cated on blue print, covering the distance as shown there, extending from De Baliviere west, the City's plan would cost \$1,432,200 and the Railway plan, \$1,129,800 an excess of \$302,400 in favor of track elevation; that is leaving out of consideration any question of practicability and assuming both plans equally practicable, taking the projects up on question of cost only.

To get a closer idea of what that money means, the Rock Island spends for its entire system for improvements an average of \$4,000,000 or \$5,000,000 a year. This excess or cost, because it has to share it with the Wabash in some form or other, would be equal to putting into one place all of the improvements on its entire system for one year. I take the Rock Island because I believe it typical of the others; this improvement if made would represent no interest at all on the investment. Someone has to pay, it represents a complete dead loss in interest. The Rock Island budget for this year, taking only things that are necessary up to its limit of expenditure, represents, if they can get the money, a saving of 30 per cent in road and 53 per cent in equipment; to translate, if we could take about half that sum, if we could get the money, and put it into our railroad, it would net those savings I indicated. Railroads are just emerging from a very difficult and chaotic condition and it is a notorious fact that the terminals are inadequate and their means of operation are expensive, at the same time there is a public demand for a reduction in rates and railway managers are about to meet it in some form or other. If that money could be saved and utilized it would represent a very material ability to save on what [fol. 578] now must be spent in extravagant and unnecessary methods brought about by the fact that the railway has not the money to conserve the investment in the way the public interests demand.

Q. What have you to say about the Delmar proposition alone?

A. The Delmar situation would cost something over a million dollars to construct. It is the keynote of the situation and if it be decided that the viaduct be elevated, it has determined for the future whenever this thing may come about, that that is the way the work must be done, because it is unthinkable that they would go to work and tear out all that work and rearrange the plan. That construction would take the heart out of a year and the construction of this plan, assuming the depression plan is advisable and assuming we leave out all that has been said, would represent something over four or five years' time; it looks like a long time; I am speaking from experience from track elevation and grade separation

work, but to spend the amount of money necessary to develop it is impossible to get a force of men in there that would do the work economically and advantageously; you are pocketed in and the result is it runs up to a longer time than a piece of construction where no operating conditions are involved; the result, a very blighting effect on all that neighborhood during that time. As a citizen of St. Louis and from my knowledge as an engineer, I never would permit that type of construction even though the Commission and railroads were for it.

Elevating the tracks presents a different problem; the attack is different. Facilities for hauling trains during construction, taking [fol. 579] care of traffic during that period represents a much simpler and more convenient problem. It is practical to elevate the tracks as indicated by those plans and still maintain the street and railway traffic during construction period. The time for the elevation would be easily about 40 per cent less than what it would be with track depression plan. While the City may bring out a great many technical questions, as a practical engineer and railroad man having wide experience in this question of track or grade separation, a very complicated question, it is difficult to work out a plan and have everything fit; it is an expensive and difficult proposition.

In the Chicago situation I ordered our own company to handle the work; we had from 1,200 to 1,500 men for a number of years and had a regular department of which I was head. I am very familiar with all the problems and testify from personal experience.

Mr. Brown:

Q. You have a railroad between De Baliviere and Forest Park, haven't you?

A. We thought so, yes, sir. You mean by the City's plan? There is a jumping off place there somewhere we don't need. If nothing is done so far as the Wabash is concerned and this Rock Island plan cut out, it will cost about \$625,000 to take care of it because we have to toboggan slide to get out of the hole. Between De Baliviere and the north line of Forest Park we own a right of way about 50 feet in width immediately north of the Wabash right of way; we have a railroad track there in operation. We are operating our passenger trains over the Wabash tracks between De Baliviere and Forest Park under a temporary contract between our company and the Wabash.

[fol. 580] Q. About the permanent rights of the Rock Island to use the Wabash tracks, they are confined to the territory between the north line of Forest Park on the north and Union Depot at Eighteenth street?

A. I so understand it. Our company has no rights at all of a permanent nature to use the Wabash railroad between De Baliviere and the north line of Forest Park.

Q. Isn't it a fact that under the City plan they have taken your railroad from River des Peres and cut it down to De Baliviere to the depth indicated and left your railroad between De Baliviere and the north line of Forest Park up on the surface?

A. Yes, sir. There is nothing that I can discover in the City's plan that contemplates any change in our railroad between De Baliviere and the north line of Forest Park.

(Mr. Senti desires to defer his cross-examination.)

Mr. Rodehaver:

Q. I believe you stated that depression of the tracks under the City's plan would retard future development and growth of the Rock Island Railroad?

A. Yes, sir. I did not mean in that vicinity, not only here but on our lines west. Our business is developed westbound and any retardation here will have its blighting effect on westbound business because of the difficulties in operating which will be introduced by the depressed plan.

Our possibilities for the future are reduced because we have to take our choice of ultimate development at this time against normal development. That means if this be constructed in a cut with two tracks the cost of further widening or developing the property is so enormous that it is seldom, if ever, done. This estimate I give does not include the development of the maximum or [fol. 581] ultimate development of our right of way, it includes taking the tracks as we have them and pushing them down in the hole.

Q. You don't mean it would retard future development of freight operation over that piece of track?

A. I do for this reason, we have the right under our rights with the Wabash to do a freight business in the City of St. Louis which we are not at present doing, but as to our future around over the terminals where we now operate, our freight line is not our line, it is a leased line, our Carrie avenue yards belong to us, whether we remain there and operate over there is another question. We have a right to freight and passenger business over the Wabash and to reach every one of the industries.

I mean to say it would retard any possible growth of future industries on our lines.

Q. Where are there any possibilities of future industrial development on your line between Union and the city limits?

A. That question is speculative, as the work is done in perpetuity and what the future may develop in large cities is a question that any man who looks at statistics of development of large cities can best answer.

Q. You haven't a single industry on that east track?

A. All industries in there are Wabash industries which we have the right to enter and to switch and take business from the same as the Wabash has and we have done so in the past and probably will in the future. I haven't any specific information as to the industries before me. I did not say we had any. I say all industries that are reached from the St. Louis end, whether they be developed on the Wabash or not, are the same as ours because we [fol. 582] have the same right to enter as the Wabash has. We

haven't any industries now, but we want the possibilities for the future.

I am familiar with the zoning laws of cities generally. Any zoning laws are predicated upon the city itself, and the existing law doesn't necessarily protect the future.

At this point an adjournment was taken until 2 p. m.

R. H. FORD, resumed.

Cross-examination by Mr. Bowen:

Q. I offer you City's Exhibit 53. Does that show in a general way present tracks of the Rock Island from its connection with the Wabash tracks westwardly to Elmwood Park; does it also show the connection that the Rock Island owns from its main line at Elmwood Park eastwardly to a connection with the St. Louis Belt & Terminal Railway Company?

A. Yes, in a general way, except I notice you have here a wye connection with the Wabash.

Q. North of Page boulevard?

A. That is not there. With that exception that shows the situation in a general way.

Q. Your freight in general is brought in now over the connection with the Terminal, west of the Belt, and thence eastwardly to your yards in Carrie avenue?

A. Not altogether; we have industries on the Rock Island which [fol. 583] we have to switch between Forsythe junction to De Baliviere and Washington University that we have to take in. We have used and did use until before the war the right to all industries of the Wabash east of Union; I don't remember where the last one comes in.

The industries I mentioned along by Washington University are outside the city limits, but all others are inside the city limits.

We haven't served those other industries since the war; the Wabash is doing our switching for us; we serve them just the same; the only thing is they take the cars in and do the switching and we don't; how long it will last, I don't know. That drawing also shows a proposed connection between the Belt Line and the Wabash, being tracks north of Page.

Q. If such a connection were built, would it be practicable to bring your passenger trains into the Wabash Railroad line and follow the Wabash Railroad Company's line down towards the Union station as at present?

A. We concluded it wouldn't, because the Belt Line is an overhead crossing now, and the Wabash is a considerable distance below, and we have about concluded that the cost of making that connection would be introducing another oppressive grade in our lines. I don't say we have finally concluded, because we haven't, because the engineers are working on that, but I say we have about concluded because of the grade.

The cost of connection is in proportion to the improvement; to-day, in railroading, when anybody undertakes to make any im-

provement in their line, they consider the question of operating profile, and this would introduce a considerable grade. I think I [fol. 584] should add, in justification of the question you asked, it might be possible by increasing the cost a good deal to parallel the Belt Line until that grade was overcome, but I don't know that that grade is practical.

I would say those figures showing the lengths of the two routes are approximately correct; it shows the present route to be 627.56 feet longer than proposed route; I think, however, your question is apt to be misleading in that the distance in feet really cuts but very little figure; it is the question of operating grades in the compared section; it might be, for example, that the longest line was much cheaper and more conveniently and economically operated, the much longer line; it is merely incidental to the question which I think you had in mind, that is, which is the most favorable line?

Q. I show you City's Exhibit 124, which shows present profile of the Rock Island between its connection with the Wabash and a point marked "Bonhomme Road"; by referring to City's Exhibit 53 you will note that Bonhomme Road is very close to Olive street. What proportion of the total length of the Rock Island tracks between De Baliviere and the connection of those tracks with the main line at Elmwood Park would you say is represented by that profile?

A. The proportion between Bonhomme Road and De Baliviere is very much larger than the proportion between Bonhomme Road and Olive Street Road. I would say it represented four-fifths of the distance.

Q. In considering the advisability of bringing your trains in over [fol. 585] the route suggested, you would consider the profile that you were giving up, would you not?

A. Not necessarily so, because the question of the operating conditions between the other section or the abandoned section would enter into it. There are so many questions that to take it in the abstract I don't think the answer would be competent. I said, in determining such a thing, railroads would take into consideration first of all the profile.

Q. Taking into consideration what are the grades as shown by that profile of your existing track?

A. Rising to the west over the Bonhomme Road is 1.14 and ascending, 1.21. Those are momentum grades. The grade approaching the summit near Forsythe boulevard, as indicated on blue print, is 1.44. Those grades are either mild or steep, depending upon whether they are momentum or ruling grades; in this case, this is a momentum grade. I don't mean to say they are desirable grades, because they are not; that grade, as I think the evidence supports, is not a desirable grade, and when the time comes, ultimately, that grade would very likely be reduced. From a point noted on map as Pennsylvania avenue running west we have no place on that line where we have as much as 500 feet of level grade. The grade of 1.44 per cent running west is a momentum grade for practically all of our business; when I speak of momentum grades you have

to take into consideration just what its application would be; there are times when we have trains that will stop on a momentum grade, which, so far as the train is concerned, would affect its movement; if the amount of business requiring the operation over a grade of that kind is insignificant in proportion to the expense required to [fol. 586] change it, when the time comes that it becomes a difficulty that adds materially to the cost of operation, then, if the money is available, some change is made.

A momentum grade is one where there is sufficient acceleration of moving trains to help put it over the next hill. Some of our westbound trains make a stop at Forsythe station.

Q. Running westwardly towards this grade, if 1.44 per cent, what grades are indicated by the profile that your trains would have to encounter after starting from rest?

A. There is nine-hundredths, and the profile shows an indicative 1.44, but that is hardly a true representative, because there is to get momentum on that, the grades from the summit just east of Skinker Road until it strikes the maximum road towards Forsythe boulevard should also be figured and computed; I think the Rock Island exhibit gives a more clear representation of the way the grades actually are than what yours show. The Rock Island goes so far west, but it shows from there the advantages that are gained by the train getting into motion; in other words, you don't desire a uniform adverse grade to go over the top of the summit, and the best evidence of that is the actual operation of trains.

We don't have any level space in this district on which we can make a run to get up the momentum to climb the grade of 1.44 per cent, but we have some adverse grade in it that on the east-bound grade gives us some assistance in that connection. I know you are speaking of westbound traffic, but at the same time you have a summit here east of Skinker Road that gives you some assistance before you come to strike your maximum amount of 1.44 grade.

[fol. 587] Running west towards that summit you must climb a grade first of nine-tenths of one per cent, then drop down after you get over the summit three feet in some continuous distance, so you get a relief after you reach the summit.

Q. After reaching the base of that vertical drop, it is necessary, then, to climb a hill of 80 feet, is it not?

A. I haven't figured it; as an operating man I know that the effect of those grades are not as severe as the grade you have planned on there for the straight start up a two-mile continuous pull.

Q. You go up at nine-tenths per cent grade to the top of the summit; when you reach that summit, your train speed would be considerably reduced, would it not?

A. It would.

Q. To gain acceleration you run down a hill a depth of three feet into a distance of about 1,200 feet?

A. I would say yes.

Q. From that point isn't it necessary to climb an elevation of 80 feet in a distance of 8,000 feet?

A. Technically speaking, you are right, practically, you are wrong, because your grade is not uniform and you gradually have an opportunity to gain acceleration in getting over the top of a comparatively short bit of grade near the top; that's what makes the momentum grade; you haven't a uniform, steady climb up the hill. In getting over the hill there is no doubt your speed is decreased at the time you reach the top, near Forsythe boulevard, but the practical application as an operating man is not of such consequence to interfere with your operations. At this lower end down here on the depressed line you have a variety of conditions you have to [fol. 588] work against; here you have a clean headway. The engine can pick up its speed and do its best, whereas, down here you have to work against adverse conditions; they are moisture, liability to adverse signals, the question of general safety, that, summed up with the man in the cab, whose job it is to operate his trains to safety, has a very deterrent effect on the general question of comparative grade of this kind and the one you speak of.

I know you haven't asked about comparisons; I want to make it clear that the grade you speak of, to which you apparently take exception to my explanation of momentum grade, has no bearing on such a grade of the character you refer to.

I would certainly say that, by running down a 3-foot hill a distance of 1,200 feet, and from that point up a hill 80 feet high in a distance of 7,000 feet, you have a momentum grade, providing that a proper fill is so placed that that 80 feet is not all uniform all the way. If it is steeper near the summit than it is near the base you have an opportunity to take advantage of your run in picking up speed to finally mount over the top; if the grade is long enough it would stall your engine. I would certainly call it a momentum grade.

Q. Has the City been conducting negotiations with your company for some five or six years in an effort to get your company to re-route its trains in a manner suggested by that exhibit?

A. I can't qualify on that question. You haven't been conducting negotiations with me. I don't know whether our company has advised or not the City of St. Louis that it would do everything it could to see on what terms it would affect such a rerouting of its trains.

[fol. 589] Q. In considering such a scheme of rerouting your trains would you consider the cost you would be put to in separating the grade crossings on the line suggested would be abandoned?

A. Yes; I think they would be some consideration; to what extent I am not prepared to say.

Q. I believe you stated that your estimate of cost of separating the grade crossings according to your plan within the City of St. Louis would be \$1,200,000, did you not?

A. I believe those are the figures; yes. I said we could use the money to very much better purpose; no question or doubt about that.

I understand in the plan of rerouting our trains, as suggested here, the City has offered to reimburse us on their idea of the value of our

existing right of way in the City of St. Louis. There has been no discussion between the City and the railroad that I know of as to the propriety of that amount. I think some representative of the City has named a sum of what they thought they ought to pay, but as to its representation of its worth, that is another question.

Q. So far as you know, your company has never questioned that amount in the slightest, has it?

A. I will say that we do question it; yes, sir; we haven't questioned it with you because we have had no negotiations, so far as I know, with you, but the question of its value, I don't think we would agree with you on. I don't know if there is a possibility of our company adopting this plan; I am only here as an engineer; I couldn't say as to that.

Q. If your company should adopt that plan, then any consideration of the profile shown would not be relevant to this case, would it? [fol. 590] A. It would leave us in a very peculiar position because we would have two ends wagging in the air, one way off elevated, we would certainly be damaged severely, and the other separated; if the Wabash goes ahead and owns a line and we are not connected with it as part and parcel of the same general scheme, it leaves us with part of our railroad we can't reach.

Q. I say, in the event your company does decide to reroute and run over this line, then any consideration at this time of the profile of the Rock Island Railroad Company would not be relevant to this case?

A. Oh, if we should abandon our railroad, of course the question of the action of the Wabash would have no effect on us. I am not in a position to state officially at this time that our company will not abandon its tracks and come in over your suggestion. I think I could qualify that answer by saying that, while I am not prepared to officially state that, I know they won't do it; we couldn't afford to do it, to sacrifice our investment there. The City seems to have an idea that the only value we have there is a piece of land; we certainly wouldn't feel, I know, that the payment of \$150,000 or \$200,000 was adequate for the right of way.

Commissioner Bean:

Q. What right of way are you speaking of?

A. It is the connection, your Honor, from De Baliviere around via Clayton, where we take the most of our freight business into St. Louis; the effect of that would be merely this, that we would be disposing of our railroad from its connection with the terminal for about \$150,000 or \$200,000, and, of course, we never could do that; St. Louis is a big city; it is a growing city; it would be unthinkable [fol. 591] that the Rock Island would sacrifice its rights and equities, even though it was inclined to, for any such sum as proposed by the City.

Mr. Bowen:

Q. You heard Mr. Loweth testify the other day as to the advisability of a saving of costs of operation by combining terminals?

A. I did.

Q. Wouldn't this be a very pertinent example of such a combination of terminals?

A. I absolutely think so, because this route represents the most attractive route from the west into St. Louis because of its attractive possibilities in alignment and grade for the future, not the grade for the present. Let me amplify that to clear your record. What the possibilities of these railroads in the next ten or fifteen years, the condition we will find ourselves in, is almost impossible to say, and there never was a time in the history of railroading when it is so impossible to say as it is right now; certainly it seems incredible that a very strategic and favorable entrance such as the Wabash has and the Rock Island has, by virtue of the Wabash, they would go to work and pull up their tracks under the conditions which exist at this time.

Q. By "pulling up your tracks" you give the inference that you would be giving up in some measure a connection with the City of St. Louis.

A. I want to; I want to convey the inference that the City's proposition which you alluded to was for the Rock Island to disconnect with the Wabash at De Baliviere and pull up its tracks from there on to its freight connection over the Terminal Railway into St. Louis, sacrificing the interests that it has, the industry interests that it has at least for two points in that connection, and leaving that out [fol. 592] entirely as to what the possibilities it might have for all industries over the Wabash, which it now has the full and equal right to enjoy with the Wabash.

Q. Would this in any way affect your present use of the industries on the Wabash tracks, if, by making this connection, you would still run over the Wabash tracks to all industries it now has, and in addition pass all of the industries that the Wabash has between Delmar boulevard and Page avenue, which are very considerable?

A. Yes; the Wabash with its strategic position and, as Mr. Loweth testified, it may six months or so from now permit half a dozen railroads over their line, now we have, independent of any acts of the Wabash, an absolute right from Union boulevard; we haven't any right via Page, and what arrangements, in the event we wanted to make them, we could make with the Wabash in view of the situation as it is, I don't know; certainly we would be sacrificing something that we absolutely have for something that they might give us, which we don't know what it will be.

Mr. Burns:

Q. There is also a question of railroad mortgages to be considered?

A. Certainly. It would be very surprising if the Wabash would

be willing to concede us the rights we already have over their line from De Baliviere into St. Louis.

Mr. Bowen:

Q. How, by rerouting your trains, as here suggested, would you give up in any measure at all your access to the interests east of Union? This plan does not contemplate, does it, any change in your connection from Union avenue east?

A. No; in the abstract your question is all right, and I should answer it by saying, we won't, but I don't know if we should under- [fol. 593] take to enter negotiations with the Wabash to use the Page avenue line that they might feel that they had to insert some terms in there that might exclude us, as they have been inclined to do.

Q. Will you withdraw your objection based on the ground you would be sacrificing industries east of Union boulevard?

A. No; I couldn't. I will let the record stand as it is in that respect.

Q. The way the record stands now is, you will lose all the tracks out to Union. If you gain, in addition to that, the tracks out to Page, how would you be losing the interest you have east of Union?

A. I didn't say we would. I said we might.

Mr. Brown:

Q. Doesn't that involve a construction of the court record under which you are acquiring your rights?

A. Yes, sir; a question which has been at issue for a long time with the Wabash; in other words, we don't propose to put ourselves in a position of jeopardizing in any way the rights which are at present somewhat in question.

Mr. Bowen:

Q. Under the late railroad act frequently referred to as the Esch-Cummins Bill, is it your opinion that the Interstate Commerce Commission has the power to order one railroad to allow another railroad to use its terminals?

A. That is a legal question; I am only an engineer; I couldn't qualify on that.

I mentioned that the City's plan of track depression would cost \$4,100,000. I can't say whether such an estimate was previously introduced in the record, not to my knowledge. In a general way I remember when the City's estimate was put in. I was impressed [fol. 594] with the fact that it was made apparently without any comprehension of the complex conditions which accrue in a big project of that kind, as to the amount of it, I can't say offhand. I am prepared to say that the contracting parties who furnished the different portions of that estimate were not specialists in those particular lines and they couldn't possibly take into consideration the tremendous additional costs of operation which must occur in connection with work of that kind.

I knew who they were at the time, but I haven't them offhand;

I have done too much of that work by contract and by actual execution not to know the estimates are out of all proportion to what the actual cost of the work would be. I stated the cost of constructing the viaduct at Delmar boulevard would be about, probably more than a million dollars. I don't know whether the City of St. Louis has been engaged from time to time in the construction of viaducts similar to the one at Delmar boulevard.

There has been a great deal of that class of work done in various cities. I am familiar with the fact that the City of St. Louis has built a large viaduct at Twelfth street. And one built at Chouteau avenue and a viaduct at Kingshighway. I recall that, but as to the manner and method of construction, I don't know.

I presume the City would gain experience and knowledge of cost in carrying out these projects, but I haven't any detailed knowledge and I don't know that I could qualify.

Q. The City's present estimate of cost which showed that cost at about half of your estimate, at a time when prices were very [fol. 595] materially higher than they are today, you would still believe the City was misled some 100 per cent in its estimate?

A. As to that, I think a more competent witness who will follow me would be a better judge.

Q. You don't in any way qualify your statement that the cost would be one million dollars, do you?

A. No; I am not qualifying it at all. I say there are various things to take into consideration; it is possible to construct that viaduct for less money providing you can ignore all traffic, if you have to take care as you ought to, and as all engineering projects today require that you take care of your traffic, and it is entirely practical to do so during construction, it would add to the cost of it.

I would prefer not to qualify to answer as to whether the City in carrying out its various bridge construction projects had any consideration of the traffic on the streets; I didn't make the figures on the Delmar plan and a more competent witness than I am in that respect can probably testify.

Q. Would it be significant to you that within a year of this date the City of St. Louis through its Board of Public Service and the Mayor has offered to build a viaduct at Delmar in accordance with present plans and pay all damages providing the Wabash Railroad paid \$250,000 of that cost?

A. I don't think I would qualify.

Q. Do you think the City, in making such a proposal, would fortify itself rather carefully as to what the probable cost of that work would be?

A. My experience is just the reverse; take for example in Chicago, the city is building the Roosevelt Road at an estimated cost of \$736,000; it is going to run way over \$1,000,000 before it is done. [fol. 596] I wouldn't think the estimated cost presented by the engineers and the total cost when the construction is all completed would be necessarily indicative of the correctness of the estimates.

Q. You don't know whether other railroads have accepted propositions from the City of St. Louis in which they have deposited in the City treasury the City's estimated costs of similar structures and

whether they have been built and completed within those appropriation by the City of St. Louis?

A. I wouldn't take that as conclusive, for this reason, that the City, the same as the railroads, make an estimate of the cost, tell the other fellow that so far as that is concerned they will assume all obligations beyond that; as to what the total may be, and the total cost is represented by so many things, you have got to run them all down before you get it.

Q. Is it probable the estimate of \$1,100,000 for the cost of the plan of grade separation proposed by the City is an estimate very similar to the estimate of \$1,000,000 that you make for the construction of this viaduct, 100 feet wide, composed mostly of fill and extending a distance of about 1,800 feet?

A. No; it is quite different. In the first place we have got to operate that railroad during construction, to take care of city and street traffic and public utilities during that period of time; now, to get into a hole the way we would have to, to back in and still keep it operating means a great deal of time that there will be practically nothing done; it means that with the Missouri soil we have in those deep cuts, with water conditions we have to contend with, and would have to contend with, the costs would be very greatly [fol. 597] in excess of what it would be on an open project where those conditions did not prevail. I have just completed a piece of double track in Arkansas where we had to operate under adverse conditions to keep our line open and meanwhile get in and out, with our material coming in and out; I tell you it was a very difficult problem in a large city. I have done a good deal of that class of work. Chicago is a good deal like this, furnishes a good example. The estimated cost on that line is along the same lines of what the costs are for track elevation in Chicago, details of which Mr. Richardson will supply. There are a good many items that could be added to that cost, strange as it may seem, for example the run-off is not included. I think there are a great many figures he hasn't included in the cost because they are questionable. You can't trace through in unit costs the numberless complex questions that arise in a big project of track depression done under very adverse conditions. I say this because I have been in the business a good many years.

Q. You feel it practically hopeless to get a proper estimate of cost in advance for work of that kind?

A. No, sir; I don't. I think it is practical to do it and that is why I take issue with the estimate the City has submitted; I say judgment and experience has to dictate those costs, which are not the measurable costs.

I have been over the detailed plans presented by the City, but they are pretty voluminous; the details my successors are far more familiar with than I am.

Q. You stated that with a track running in a cut such as suggested by the City's plan, which varies from 13 feet at Union boulevard to a maximum depth of 18 feet at De Baliviere, would be wet all the time and therefore make trains slip. What would keep the top of this rail wet?

A. Two things; first of all, the seepage from the ground water which you would have, due to the fact that your grade is below ground-water level; you always get in a deep cut where the drainage is insufficient, by that I mean drainage which is not readily removed, you always get a tendency towards dampness and moisture.

To get to the top of the rails the moisture would not necessarily have to rise to the top of the rail, the rains or fog or the churning action of heavy trains passing over a roadbed, sometimes when the water is well below the grade, has a tendency to work it up or churn it, making it very unsatisfactory, slows down trains, makes maintenance costs very high and operation very unsatisfactory.

Q. How does that get the water on top of the track?

A. It gets the water on the roadbed and from there it affects the passage of trains; the water itself may not get onto the rails itself, but the moisture and the dampness does affect the rail.

Q. I was questioning you on your statement that those rails would be slippery so the trains would slip. Wouldn't that of necessity mean the rail would have to be wet?

A. It depends on how you define "wetness." I would consider that a rail that is damp, that moisture collects on the rail, is wet; I wouldn't consider that the rail had to be submerged by any means to be damp, not what a railroad man calls a "dry rail."

Q. As far as rain is concerned, you mentioned as making these [fol. 599] rails damp in the cut, it is conceivable that the same amount of rain might fall on the tracks on the embankment, is it not?

A. Yes, but you have a different condition; you are open to the air where there is air and sunlight and wind that has a tendency to dry it out much quicker.

Q. You conceive in the depth there would be in the cut, there would be no air or sunshine?

A. It would be restricted. It is true that our railroad is passing successfully through cuts and fills frequently. The experience is every time it enters a cut it enters a damp place where the rails are slippery with moisture so the train slips on it and it becomes a source of annoyance and increased maintenance cost. Our cost of ditching on the Rock Island last year was \$735,000 and 80 per cent of it was in cuts. Cost of ditching means keeping them open, working it because of the action of the elements; we don't like them; if we had our way, we would build the railroad where we can get free access to the air; everybody knows it is cheaper to maintain a track on an embankment than in a cut.

Q. Is it a fact that every time you go to one of these cuts you find the tops of the rails wet?

A. Not at all, because your drainage conditions are different, your sub-soil conditions are different from what you have here; you have your ground water, poor soil, adverse conditions.

We spend on an average of about \$50,000 a month for tile drains, all in the cuts.

Q. Are all of your cuts drained with tile drains?

A. We are certainly aiming at that; they are not all drained; but we figure it is one of the greatest assets for maintenance, to de-

[fol. 600] crease the cost. The City's plan provides for such drains, but they are inadequate and wouldn't take care of the situation; while they might under normal conditions, I don't think they would, but assuming they did, they would not provide it under normal conditions of operation.

I know that between Union and De Baliviere retaining walls are shown at the foot of the slopes through the entire section.

Q. Do you know whether or not at the foot of the slopes there are concrete ditches to retain first the surface water that comes down the sides of the slopes?

A. Yes, but I also know as a matter of practical operation that they last for a certain time, then they have to be either cleaned out or something done because the subsoil gets out; the best evidence of that is the weep holes along the New Haven going into New York.

I know the plans indicate that attempted drainage has been made for the subgrade throughout the entire stretch of track, but it is not sufficient. I am prepared to state as an engineer and railroad man that the drainage as proposed by the City to take care of the railway there is insufficient. They have a large sewer on either side of the right of way that under normal conditions would take care of the water, but will not, in our judgment, take care of water that will seep in from the ground water, nor will it take care of it in times of heavy storms to an extent but what it will more or less effect the question of operation of the railroad. I am leaving out the question of putting the railroad out of business in times of flood. I feel it has been pretty thoroughly covered.

My statement of the cost of the City's plan is based upon estimates others have prepared.

[fol. 601] Q. If it should be found that the difference between the cost of depressing the tracks and elevation would be about the same, the item of cost would be eliminated from your objection of the City's plans?

A. If it should be, it would be, but I should be very much surprised; it would be counter to my experience as a railroad man and engineer. I don't suppose anybody would seriously entertain that question, but, answering that question, I will agree with you.

Q. You spoke of the advantages of track elevation in that particular district and said the item of pilfering from the cars was very much less in track elevation. Do you anticipate very much danger from pilfering from your cars if the City's plan was carried out?

A. I don't know as to that, Mr. Bowen; we are building here in perpetuity and what may happen 25 years hence I wouldn't undertake to forecast. As a city develops there is a very noticeable increase in pilfering of railroads; their claims for damages run very, very high, and that is not confined entirely to the business section.

Q. Why is it easier to pilfer from trains in cuts than on embankments?

A. I am not an expert on pilfering, so I don't know; we take the results that come. I know our claim agents and reports show that, where tracks have been elevated, our losses are materially reduced. I don't think it is a very serious thing right here, but there is no

question but it is a very serious thing where we have to contend with the losses.

Q. How do depressed tracks increase trespassers along the right of way?

A. It is easier for a man to turn in on the right of way in a depression; on an elevated structure there is no means of getting up to it.

[fol. 602] Referring to Wabash profile, no change is contemplated in Forest Park east of Grand Drive. It is a fact that along there the Wabash tracks run on level grade for several hundred feet, but the point is that leaves an opportunity on your banks for people to get from the streets direct into the embankment and you have terraces all through the park and it is entirely possible for a person to come over the top and go into the cut.

Q. You probably did not understand my question. East of Grand Drive in Forest Park, does not the Wabash Railroad Company run on level of the ground in the park for several hundred feet?

A. They run on the surface of the ground; yes.

Q. Across that stretch of ground, where they run on the present surface, is there not a well-traveled passageway across the tracks, one of the main pedestrian entrances into Forest Park?

A. Yes, sir. I don't know whether any provisions have been made in the Wabash plans for separating that pedestrian crossing; the Wabash will have to testify to that.

As far as the district is concerned in Forest Park, where the track runs on the level, facilities for trespassers getting on the right of way might be very great.

Q. Under the City's plan through Forest Park there are embankments 12 feet high on either side of the track. Would it be more probable that a person crossing those tracks would climb up an embankment, go down into the cut, climb up another embankment and go down more frequently than they would go run along the present ground?

A. Oh, I think yes; it would be, but candidly, if you will pardon me, the whole thing is immaterial to the big project involved. I [fol. 603] say it is one of the considerations in an engineer going at a huge project; those are all factors an engineer has to consider. It doesn't look to me as though the City, in making their plan, if they considered it at all, didn't place on the whole a sufficient regard to the solution of the practical problem involved; it seems to me they lost sight of that thing. I don't recall that the City brought up the matter of trespassing.

I spoke of damage to adjacent property that would be caused by separation of grades, and stated in Chicago the damages paid were about three-tenths of one per cent; I referred to legal damages paid on account of court action. I was not referring to damages that might accrue to property for which the owner would have no legal relief.

I made the general statement that the City's plan would paralyze future development for the railroad. I had reference to the paralysis

that must affect the railroad because under the City's plan they have two tracks and that is the basis on which the estimate was made; with the depressed track the only possible way to put in a third or more tracks would be to cut down that slope and put a retaining wall in its place; to do that and maintain the railroad as an operating factor it must be done under such a tremendous expense that it means it would be theoretically practical but financially impossible, probably; I think that is well known. We had to consider it in our cases in arbitration in Chicago in the decisions which were made on present and ultimate development.

I was considering normal development of business of the railroad [fol. 604] when the time would come that two tracks were insufficient to care for its business, that it would be so expensive to put in a third or more tracks, that it would mean you had arrested or paralyzed further development of the railroad.

I understand the Wabash right of way between De Baliviere and Delmar is fifty-six feet wide.

Q. Do you understand the City has purchased additional land on both sides of the right of way in order to provide for carrying out this work and making provision for putting in four tracks?

A. I understand they purchased approximately 2,000 feet as compared with a total of two miles or thereabouts for the entire project. I do understand the City's plans and estimates are based on bridges in every instance being built for four tracks, although the railroad has but two tracks in there at the present time, and, as I recited a moment ago, those are only small items in the total cost of any extension; you might as well leave them out, because it would be financially impractical to use them, in the endeavor to get that, to utilize the balance of the right of way under operating conditions, take a cut of this character and after construction with the moisture that must inevitably collect in there in wet cuts and to take that out and still continue the operation of your railroad with the development of business that has taken place during that period on your cross streets, from an engineering standpoint it is entirely practical, from a financial and operating standpoint it is very impractical.

Q. Is that also true with reference to your other cuts. For instance, this one out near Forsythe boulevard that reference has been [fol. 605] made to?

A. No; the conditions there are radically different; we are outside the city limits in an undeveloped section, where it is entirely possible to do a great many things; we have free, open range; the drainage conditions are altogether different; the facilities of construction and operation during construction are altogether different.

I spoke of that particular part of the grades shown by the City's plans over the River des Peres, where we rise up and fall down again, as toboggan slide grades.

Q. You don't mean to say you do not have on that same stretch of track grades with as great frequency of change and steepness as shown there, do you?

A. I have no objection to cutting out the "toboggan;" I may have unwittingly referred to the toboggan slide; it is an undesirable grade.

I stated it was very practical to make a very beautiful setting for elevated tracks in Forest Park. I mean that the possibilities of terracing that line through Forest Park and the setting of the bridges as it crosses the streets, taking the whole thing in harmony the same as is being done in many other cities, it is a very interesting and very nice problem. Perhaps I said it was "unfortunate" to run a railroad through Forest Park without having it up high enough to see the beauties of the park; I will say it is undesirable; personally, I think it is unfortunate.

Q. If it came to determining whether the view should be retained for those passing through on trains or the people of St. Louis who [fol. 606] have paid for and maintained the park, it would be in favor of the people of St. Louis who paid for the park?

A. That is a question of opinion; I think that can be made just as beautiful with an elevated line as it can with the road taken out of it. I haven't a doubt of it.

I stated that a rise and fall theory is not applicable to a determining of the economic effect of making a change in the grade as proposed by the City's plan. I stated it had been done by a better method.

Q. Has your company prepared and has ready to give to the Commission an estimate of this kind on which a criticism can be based, so we may get at the actual facts in the case? If the Commission is to make a decision on that basis, don't you think they should have the real facts of the one rather than just the general statement of someone who is an interested party?

A. I would be glad to refer the Commission to one of the most able writers on the subject, Onward Bates, past president of the American Society, who says the rise and fall theory applied to a practical operated line—I do not quote his exact words—it is impractical of application. Prof. Raymond, the author of one of those formulas and the writer of a book on Rise and Fall, does not for a moment expect that his formula would be applied to a practical operated line.

Q. In discarding the method by which an estimate has been arrived at, have you submitted evidence showing a proper method or anything on which the Commission can make an intelligent estimate of that feature of the plan?

A. Yes; I think the record of Supt. Rorourke in this case fur-[fol. 607] nishes ample opportunity for the Commission or its engineers or anybody else to determine what a practical comparison of those grades is; I don't think, Mr. Bowen, it is entirely an engineering question, except by reference to practical operating conditions. That is the way we treat it in a grade-reduction work.

Q. You don't think the City approached this problem without a very serious consideration of the value of these railroads and the necessity of preserving their usefulness in order to add to the development of the City?

A. Mr. Bowen, since you ask me, I am free to confess that in all my experience, I have never seen a plan presented to a railway company that seemed to so far forget that feature as this does. In doing that, I don't want to question the motive of the City.

Q. But the measure of that would be the concrete fact, as to just such things as we have suggested, the economic effect of rise and fall and not to general statements?

A. I think that that is represented pretty largely by experience in problems of this kind; I would think so.

Mr. Burns:

Q. Is there any cut on the Rock Island lines, considering it has nearly 8,000 miles of operating lines, where at present we go below the ground-water level?

A. Oh, yes; we have a number of them, and it always gives us trouble wherever they arise. This would simply be adding another one to our present burdens.

Mr. Burns offered in evidence Exhibit No. 2, being a certified copy of final decree rendered December 31, 1886, in *Central Trust Co. [fol. 608] of N. Y. et al. v. Wabash, St. Louis & Pacific Ry. Co. et al.*, giving to the St. Louis, Kansas City & Colorado R. R. Co., predecessor of the Rock Island, trackage rights from the north line of Forest Park to Eighteenth street, at the Union Depot, and read par. 7 of said decree:

"And the said intervenor, the St. Louis, Kansas City & Colorado R. R. Co., by its officers, agents and employes and each of them is hereby authorized and permitted with its right of way, road, tracks and property, engines and cars," etc.

Said paper was marked "Exhibit 2."

Rock Island "Exhibit No. 3" also marked.

A. O. CUNNINGHAM, being duly sworn, testified as follows:

Direct examination by Mr. Brown:

I am chief engineer of the Wabash Railroad Co. I have been in that position seventeen years. I was brought up in the schools in England, graduated at Minnesota University in civil engineering; previous to the time I graduated at Minnesota I practiced engineering or surveying, and since my graduation I have been continuously employed in engineering work either as a contractor or engineer.

I was contracting manager for the American Bridge Company, in Cleveland, in which position I was compelled to make estimates on all kinds of structures, including bridges; after that I was three years as bridge engineer for the Wabash before becoming chief engineer.

[fol. 609] Q. You have had rather special occasion, then, to consider the question of bridge designing and structural engineering of bridges, haven't you?

A. I wouldn't say that I have had only that experience; I have had a great deal of experience.

Q. It has been indicated in this record that the attitude of the Wabash Railway Company has consistently and vigorously been

opposed to every plan or every suggestion of the City for elimination of grade crossings. Will you briefly state in your own way the history of the negotiations that led up to present controversy?

A. Many years ago, when Mr. O'Reilly, now one of the Commissioners, was president of the Board of Works—I think they called it—of the City of St. Louis, the subject of grade separation was advanced, not proposed, and at that time Mr. Carl Gaylor, who was then city bridge engineer, looked at the situation pretty thoroughly and presented a paper on grade separation of the City of St. Louis between Lindell and Delmar—I mean Lindell and Union—before the Engineers' Club of St. Louis and advocated practically the very thing the Wabash plans show today. That paper is of record in the library of the Engineers' Club.

After Mr. O'Reilly left the City as president of the board, Mr. Max Reber became president and appointed Mr. Bowen as bridge engineer. Mr. Gaylor was quite an eminent engineer; he built many structures in St. Louis. I believe he was educated in Germany, and whatever he proposed was generally considered as good engineering.

About the time Mr. Max Reber was appointed president of the [fol. 610] board, Mr. Pitzman undertook the development of some properties in the vicinity of Lindell drive, property along Lindell drive between Union and Skinker road; he also laid out the grounds for building purposes and development of the Manning Realty Company. That territory extends from De Baliviere northwardly to Delmar on both sides of the Wabash. Washington Heights was on the westerly side of River des Peres. Mr. Pitzman, about that time, suggested a grade separation, which would be a depression between Union and De Baliviere; shortly after, the City prepared plans showing such a grade separation with approaches leading from the overhead bridge at Grand drive leading to the depressed portion proposed under Lindell and Union, starting to rise at De Baliviere, continuing across Delmar, depressing the railroad slightly at Delmar, I think about two feet; this plan contemplated no drainage. I had had some experience with water in that vicinity, when reconstructing Grand drive bridge and tearing down the old foundation in 1904, we encountered a tremendous amount of water, though we didn't go very far down with the foundation; it was my intention at that time to take out all the old stone in the foundation, but I found we would be running into difficulties that would be hard to encounter, so I built the new structure on parts of the old foundation without removing them. During the World's Fair the Wabash raised its tracks over De Baliviere and depressed the street sufficiently to permit of pedestrians entering the grounds of the World's Fair in 1903—at that time the street car company built an undercrossing [fol. 611] just southwardly or easterly, whichever you call it, from De Baliviere and went with their street car tracks under the railroad. That is one of the main entrances to the World's Fair. During the time when people were using the undercrossing at De Baliviere and during the time when the street cars were using that undercrossing, there was at times sufficient water, both in the street car cut and in the cut under the street, to prevent the use of them, though both of them were drained; in addition to the drain under the street car

passage, there were pumps and these pumps were used almost continuously.

Because of that fact, when these plans were first presented by Mr. Reber suggesting the Wabash be depressed, I raised the question about the water and suggested that a well be sunk to ascertain where the ground water level was and the quantity. A well was sunk for that purpose near Union boulevard. I received no notice of that pit being sunk, and it was filled up before I had a chance to look into it.

That is the history of the first scheme, and naturally the Wabash would object to it.

There were serious objections to the Reber plan, not only from the drainage standpoint, but from the standpoint of railroad gradings, but I didn't at that time think the plans were of sufficient moment to bother with anything else but the water.

The City changed its plan, not because of the water, but chiefly because of the gradients, because the grade from Grand drive to Union was over one and one-fourth per cent, and that is one of the features that was contrary to usual practice; it changed the grade [fol. 612] along the present right of way of the Wabash leading from Kingshighway with the idea of destroying the present railroad in the park and building in its place another railroad at the northerly end of De Baliviere; not very many changes were made except that the grade was raised from De Baliviere to Delmar, so it would be raised the same grade as the street at that point; at that time no other changes were made, and no provision was made for drainage. At my suggestion, additional pits were sunk to determine the water level, one near Union, one near De Baliviere and one or two intermittently.

Water was then kept track of in these wells. I went down to one of the wells and found that the soil was somewhat of a porous nature and readily sluffed off. The City went a little deeper than necessary in one of these wells and punctured something that developed an artesian well, so the water came nearly to the surface. I think they said it was sixty-five feet deep. If that is a fact, how will we know where the water will be when we come to excavate through that; we excavated in four places; we might strike a place where the water might be very serious. The result of ascertainment of this water resulted in a further change in the City's plan; that made it necessary to put extensive drains in the cuts and approaches, and to cap the climax, a long 42-inch sewer, 10,000 feet long, from De Baliviere clear through the park until it reached the River des Peres on the other side of the park; in addition, they thought another change might be advisable, instead of carrying the railroad along its original [fol. 613] embankment, they thought they would change the railroad so as to cross Lindell and Union at its intersection in the park, the object being to save the cost of a bridge supposedly, but really to get enough elevation in Union avenue to cross the bridge. I objected, not only on account of the grades, but the possibility of wetness of the soil and sub-grade and to low clearances under the bridges and to many features that were advanced by other engineers.

I believe that final scheme as presented now was proposed some time after the war or during the war, I am not clear as to exact dates.

Q. It has been changed two or three times during the progress of this hearing, hasn't it?

A. The trouble was that the City advanced a design with so many difficulties in it that they had to make so many maneuvers and jump backwards and forwards in order to get something they could call a design.

Q. Over a period of ten years the City's plans which started with an elevation plan, have gone through various evolutions until we have the plan presented here. Is that correct?

A. I can't exactly say that, because the elevated plan, while proposed by the former bridge engineer, was never presented. That was the first suggestion of the City. It may have been only a personal opinion of Mr. Gaylor, but, being a man of some reputation and a City employe, we naturally supposed he had investigated the situation and knew what he was talking about when he presented that paper.

During this period during which the City presented these various [fol. 614] plans for depression of the railroad south of Delmar, there were numerous conferences held with the City officials by the Wabash officials. Throughout those conferences the attitude of the Wabash has been consistently in opposition to any plan for depression of grades for the railroad south of Delmar.

Long before this controversy reached the state of litigation before this Commission, I made an investigation, as an engineer, of the difficulties and the disadvantages of this depression scheme of the City for the purpose of reporting on the engineering features of it to my superior officers. In making those investigations I had no thought of building up any case or defending any case before either the court or Public Service Commission of the State of Missouri.

I have been in the hearing room and have heard the testimony of the witnesses, Mr. Currier, Mr. Loweth and Mr. Richards, and other witnesses who testified on that subject as to the disadvantages of the depression plan for grade separation and the advantages of the elevation plan, so-called. It is my opinion that the disadvantages of the depression plan, as indicated by those witnesses, are well stated. I agreed with them generally in respect to the advantages of the elevation plan.

Q. There is one point on which I wish to get your judgment, that is the question of the viaduct at Delmar; what are your objections, if any, to that structure as prepared by the City?

A. My main objection is that if it is built, it will require the City plan to be carried out. That is the one objection.

[fol. 615] Q. You mean that once a viaduct is built at Delmar, as proposed by the City, it is irrevocably fixed, the depression plan, for any elevation which may here be made of the street crossings south of Delmar?

A. Yes; unless several present crossings are done away with. There are five grade crossings between Delmar and Union, including Union and Lindell, beginning with Delmar, going south, Hamil-

ton, Waterman, De Baliviere, Union and Lindell. The Grand drive is there now, but there will be a change under the City plan. There will be the expense of making the change from Lindell to another entrance over the railroad at quite an expense; whether it is to be paid for and is included in the grade separation or not, I don't know. There is also a foot bridge just south of there which at present is an underground foot passage.

When the Delmar viaduct is constructed, as it is shown by the evidence of the drainage expert, at the opening provided for the River des Peres under its present condition or the condition proposed by the plans of the City, they are not sufficient. Therefore the water must of necessity go through, excess water that cannot get through the opening provided by the River des Peres must go through the structure that carries the streets over the railroad. According to City's plan, an 18-foot clearance is provided. I do not regard that as a proper clearance. No structure of that kind should be put over a railroad track in this day and age unless it can't be done otherwise.

I believe the proper method of separating the grades at Delmar [fol. 616] is by raising the railroad tracks over the street, both for the railroad and the City. It would make no difference assuming the River des Peres was completely harnessed or obliterated from the project.

Q. You have talked about water danger in the deep part of the depression between Union and De Baliviere and west thereof, where it has been testified over and over again that the City proposes to put the railroad below ground water level. Have you any other place on the Wabash where you have a condition of that kind?

A. I don't know of any. I would not, as a railroad engineer, approve any construction that would put the track below ground water level. My reasons in that respect are such as have been detailed in regard to the practical impossibility of maintaining a proper track.

Q. The City proposes, in its present plan, to wipe out the present Wabash Railroad through Forest Park and set it over on the location shown on model back of you. Is it your judgment that a railroad laid in the cut which the City proposes would be as good a railroad as the one you have now on the embankment that has been there since 1875?

A. There is no comparison; anybody with any sense knows that a railroad on an embankment is the best place to put it.

After you have constructed a railroad it takes a good deal of cost which cannot be fixed out in solidifying the railroad bed, and that can only be by increased and keeping the track up during several years after construction of the railroad. It costs money to season a railroad. My judgment is that the substituted railroad which the City [fol. 617] proposes here will not be of equal value to that of the present right of way and railroads which the Wabash has in the park.

The City has made no proposition or suggestion as to method by which they propose to acquire and destroy the present railroad of

the Wabash in Forest Park I didn't care so long as we got a railroad that we could operate over, so far as the engineering features are concerned, if they moved us in the park, it doesn't matter, provided they give us a place where we could operate. I say the railroad we own is a better one than the substituted one the City proposes.

I am familiar with the City's plan and with the fact that the Rock Island runs between the north line of Forest Park connecting with the Wabash at Union and De Baliviere; at present the connection is at De Baliviere, but the real Rock Island crosses the railroad at De Baliviere and runs on the easterly side or northerly side, until it gets to our tracks at Union and Lindell.

Under contract between the Wabash and the Rock Island that crossing of the Rock Island on the Wabash tracks at De Baliviere was taken out and the connections made since 1911, the Rock Island has been running their trains over the Wabash tracks between De Baliviere and Union. That contract is subject to termination on short notice.

The City has made no suggestion nor do I know anything about what the City proposes to do with the Rock Island between De Baliviere and where it connects with the Wabash at the north line of Forest Park.

[fol. 618] I know of nothing in the estimates of cost of the City which makes any provision to compensate the Wabash for its present railroad in Forest Park, nor that the City proposes to compensate the Rock Island for its railroad between De Baliviere and Union.

Profile map, Wabash "Exhibit 27," was prepared under my direction. It shows the profile lines of present Wabash Railroad, the line as proposed by the City, and the line which I have suggested as the elevation plan. They have been so marked on the map.

Q. Taking the question of grades as between the proposed City plan and the proposed elevation plan, which, in your judgment, provides the better grade for maintenance and operation?

A. There can be no question about that because the Wabash grade is practically level. There is a small distance of about four-tenths of 1 per cent; the rest is practically level. The short distance is between Grand drive and Lindell and the maximum is four-tenths of 1 per cent; that grade is not quite 2,000 feet.

Q. As against that maximum you have on the City's plan a sustained grade of eight-tenths of 1 per cent from De Baliviere to north of the city limits, have you not?

A. Yes; as the City plan proposed, it goes to Page avenue, on that same grade, but makes a very long grade practically eight-tenths of 1 per cent from the lowest point on De Baliviere to the highest point over Page avenue. On all of our grade separation work changes of grade, I should say, we work to four-tenths of 1 per cent.

[fol. 619] The grade such as the City proposes here of eight-tenths of 1 per cent for distance indicated is absurd for new construction work. That construction is exaggerated by the fact that a passenger depot is located at Delmar avenue on that grade and also that there should and will be an interlocker at De Baliviere. The Rock Island

has a passenger station at De Baliviere, and I presume it will also build one when this whole project is approved in some way.

There is no difficulty on the elevation plan of treating the railroad embankment in such a way as to avoid any ugly or disagreeable feature; there is no difficulty in so treating bridges that are to be put over the streets in such a way as to make them harmonious. In the plans we suggest, there are no changes made in grades of the streets at any point.

My plan has the advantage that it entirely obviates all consequential damages to abutting property. I might further say it does away with all cost that will have to be gone into to supply the drainage on that 42-inch sewer. It also does away with all cost and expense of tearing out present tracks of the Wabash and bridge in Forest Park, and it does away with all that extra expense which the City had to go to because they had some kind of a scheme in their head that it would be satisfactory to a few citizens in the vicinity of Union avenue.

Q. There is only one place, as I understand, where in your judgment, any criticism of the elevation plan can be made, and that is from residents near the track where it crosses Union and Lindell drive?

[fol. 620] A. There might be an objection so far as I know from two residences, or it may be three, close to Lindell and Union avenue.

Q. Isn't it a fact that each of those residence you refer to, that those are the residences of Mr. Woods, Mr. Pryor and the one just west of Mr. Pryor?

A. A man in the stone business; I don't recall his name; he has a white house. These residences have been built there in recent years. Mr. Pryor's residence was completed only a year and a half or two years ago. All three of those houses in what you might call proximity of Union were built after the time when it was proposed to depress the tracks. Also after it had become generally known there that the railroad was insisting that the separation of grades must be accomplished by the elevation plan. I talked to two of the residents; the third I don't know. They asked me about the scheme of separating the grades. I told them I believed it would be by raising the railroad tracks, because in my mind it was the only feasible one.

I have prepared suggestions, and these are they and they will give an idea of what might be done. I have plans and sketches and completed plans of the elevated scheme where the tracks are raised above the streets.

Said plans and sketches are marked "Wabash Exhibits Nos. 28 and 29."

Picture showing Jefferson Memorial marked "Wabash Exhibit No. 30."

Outline of proposed station building marked "Wabash Exhibit No. 31."

[fol. 621] This Exhibit No. 31 is one of my suggestions for the treatment at Delmar avenue under elevation plan; here is another for the same location.

Wabash Exhibit No. 32 marked.

Q. What is the difference between this picture, Exhibit No. 32 and No. 31?

A. That is following the usual line of street bridges that are being followed by railroads now; the other is more artistic and used in entrances to parks. This exhibit shows how the banks could be treated so that some artistic effect would be obtained. This is a landscaping of embankments between the streets.

Exhibit No. 33 marked.

These plans show typical cross sections of the Wabash plan; it is a cross section of embankments and the roadbed; that consists of seven sheets.

Exhibit No. 34 marked.

I am offering a blue print plan of bridge which I propose to construct at Union and Lindell. It is proposed to locate it on present line of Wabash track.

Wabash Exhibit No. 35 marked.

This is the blue print plan.

Wabash Exhibit 36 marked.

The water-colored sketch showing the bridge at De Baliviere will be the bridge as shown on this plan and also for Delmar.

This is the one showing the uprights in the streets.

Wabash Exhibit No. 37 marked.

[fol. 622] I prepared a picture of this bridge showing how it would look when completed. There is a plan showing Waterman avenue bridge; this one is Hamilton avenue. Waterman will be Exhibit No. 38.

Wabash Exhibit No. 38 marked.

The next is Hamilton avenue.

Wabash Exhibit No. 39 marked.

The next is for Olive Street road.

Wabash Exhibit No. 40 marked.

Q. I show you a group of photographs that show in succession, beginning with the first one, the Wabash Railroad extending westerly from Kingshighway under crossing, then successively through Forest Park, past Delmar Station, showing river des Peres west of Delmar and the flooded area in that neighborhood during 1915. Glance through them and state if they are a fair representation of the views.

A. Yes, sir.

Wabash Exhibit No. 41 marked.

The first picture shows the train entering under crossing at Kingshighway. That indicates that the smoke rises up at the side of the under crossing. The next shows picture of Grand Drive bridge and Grand driveway under it, with a train on top, and the third shows the view looking east toward the Grand Drive bridge in Forest Park; the fourth one is a view looking along the embankment and shows the railroad embankment on both north and south at that point. That Grand drive bridge is a design of my own. The fifth picture [fol. 623] shows a view looking northwardly after you cross Union, and that large building on the right is a garage. The large buildings there are apartment houses some distance north of the Wabash

tracks. The sixth picture is another view of that garage; the seventh picture shows the double-track railroad through Nina place with the filled banks on both sides on which these houses have been erected.

The eighth picture shows a section of the railroad in that depression caused by the filled ground on the side; it is a dumping place for refuse. I know that to be a place where people dump everything they have got because it is so unsightly. The next picture shows the same condition.

Q. I call your attention to the poles and sagging railroad telegraph wires; isn't it a fact that on an elevated plan those wires can all be taken care of?

A. Yes, sir, and those poles eliminated. The next view is simply a view of the channel of the River des Peres looking south from Delmar avenue. Here to the right is the building up on the embankment west and south; the next one is another view of the channel a little further south, where it is cut up to the Wabash right of way. The next is Delmar Station; the next is River des Peres.

I have a residence abutting on the Rock Island. In Parkview. That is in the district north of Washington University. When I lived on the lot that abutted the Rock Island the smoke and cinders generally hit the third story of that build if the weather was dull, and generally speaking, the smoke and cinders went over the house and assimilated before they reached the other side of the street. [fol. 624] If the Rock Island had been on an elevated embankment I don't believe I would have noticed the presence of smoke and cinders.

My house was about 100 feet from the track.

Q. That property in Parkview along the Rock Island Railroad and to the west clear out into the county along the Rock Island Railroad has been developed and built up by most substantial and highclass residences, hasn't it?

A. It is very beautiful; some of the lots of these buildings abut practically on the railroad right of way. The presence of the railroad at that point and the operation of it has not in the least retarded the development of that property west of Skinker road; that is about the only place in St. Louis that it has developed any to any amount. The Washington University is the boundary line of the tracks. The Washington University and buildings there have been constructed since the Rock Island Railroad was built and operated there; the Rock Island serves the university with coal for its powerhouse, which is located on the tracks of the Rock Island.

Q. To the west of Parkview place, going west on the north side what is known as Ames place, a residential district, on the other side you cross the Rock Island and Marland Terrace is a residential district, and on the west within the last two or three years additional residential districts have been laid out on both sides of the Rock Island clear out practically to the corporate limits of the City of Clayton?

A. Yes; and those are beautiful examples of residences; in some places the lots are landscaped right up to the railroad embankments. [fol. 625] I am quite familiar with conditions around Delmar

crossing. Every day I am in town I cross that crossing about twice. I don't think there is any present necessity for the separation of the grades of the railroad and the street at that place.

I heard the testimony of Catterton, the agent, as to how the traffic was handled at that point. I am familiar enough to say that it is the same as Mr. Catterton stated.

I heard the testimony as to water conditions in the flood of 1915.

I observed them; I was prevented from crossing the tracks at Delmar on account of that flood and had to make a long detour to get to my residence. At that time I was living on Pershing in Parkview and working downtown. A very large area was under water; it looked like a river to me; it wasn't as large as the Mississippi River nor as large as the Meramec.

That flood map, Wabash Exhibits 2 and 3, was prepared under my supervision; I suggested that be done to show a bird's-eye view of what would and did happen. The City's figures were taken to outline the flood area; the surveys were based on the City's figures.

At this point an adjournment was taken until 9 o'clock in the morning.

Testimony of A. O. CUNNINGHAM resumed.

Mr. Hall:

Q. Have you considered the probable appearance of the slopes [fol. 626] of the Delmar viaduct if constructed according to the City's plan, as to the effect of rainfall upon these slopes of the viaduct of Delmar boulevard?

A. Yes, sir. On all embankments the slopes are eroded continually for a good many years; as I understand the City plan, the approaches to the bridge over the railroad tracks have slopes and the earth embankment is not retained within retaining walls; this earth slope extends over on the adjoining property, making a V-shaped section of earth, extending on the adjacent property; as time goes by, after the new embankment has been built and sidewalks constructed the street pavement and street tracks laid on the new fill, the slopes will naturally erode, due to the action of the elements; that means that the embankments above the sidewalks will be washed away in places and the sidewalks will naturally fall down, not completely, but become uneven and broken in places. Unless these banks are sodded or taken care of properly, they will become very uneven and a great deal of money will be necessary to be expended to keep the slopes in proper shape for some time to come.

Taking the roadway proper, it has been my experience that all embankments settle greatly; we have a long slope, a long earthen embankment on both sides of the abutments supporting the bridge; it is proposed to place on top of this fresh embankment a concrete surface first and wood pavement with the street car tracks, and with the pavement extending between the tracks and from the tracks to

the sidewalk; tracks under a street car or under a rolling load like that settle; that can be seen readily by the bridge at Union avenue, which [fol. 627] is in very bad shape; I believe it was built several years ago. The approaches to that viaduct on one side are very short, on the other side not any more or as much as would be on one side of the approaches on proposed bridge at Delmar; the advantage that the Union avenue bridge has in reference to settlement of street car tracks compared with settlement that will occur on approaches to the bridge over the tracks at Delmar avenue is this, the tracks are completely separated from the pavement of the street similar to that which is now on Delmar avenue between Kingshighway and, say, Union; in other words, the street car is run on a ballasted surface with a curb on each side which makes no connection with the street pavement. On Delmar it is proposed to pave the whole street, including that between the street car tracks as at present. Knowing the way these high embankments, or any embankments, settle, you can see what kind of condition that street car track will be in for a good many years to come and what a tremendous cost it will be in keeping up the track because the pavement of the wooden blocks or whatever is to be placed there will have to be taken up in order to resurface the alignment of the tracks. That is not taking into consideration the maintenance and trouble and expense and damage that will be caused by settlement of roadway.

In my opinion there will be a great many derailments of street cars, because they won't be able to maintain those tracks in proper surface because of the continual settlement. I should judge it would be about five years before it would be prudent to put down [fol. 628] permanent paving. In the meantime the proper method would be to provide some temporary pavement. In that respect, I refer to recommendations of all highways engineers who propose to construct what is called "hard" roads—you will first build your earthen road, let it be traveled a sufficient length of time until it becomes perfectly settled, probably no more settlement will occur; simply first let the roadway be traveled; next providing macadam. This method should be applied in this particular case.

At De Baliviere avenue, the City proposes to introduce a 10 per cent grade from the foot of De Baliviere to an elevation over Page avenue, a distance of at least two miles; I believe it is 9,000 feet or more; that introduces a much longer grade than there is at present, which is objectionable; such a grade or such a length should not be introduced in new construction work.

At present the grade at Delmar is a practical level and the grade west of that point is about six-tenths per cent; it is bad enough as it is; why should a much worse one be introduced in new construction?

We all know such a grade is going to cause a great deal of noise and smoke, due to the exhaust of the engine in trying to climb that grade, especially starting on such a grade without any run for the grade.

Q. Did you hear or read the testimony of Prof. H. W. Hayes, who testified at St. Louis March 1st? He says on the bottom of

page 259: "The change in the railroad crossing from existing crossing is summarized by statement that the net additional change is [fol. 629] 15.69 feet, distributed over a distance of about three miles. This would show an average change net rise and fall of about five feet per mile, which is small." As an engineer, particularly dealing with the subject of railroad grades, have you ever known of that method being taken of determining whether grades on a particular piece of road were excessive or practical, particularly when located in the limits of a city, such as in this case?

A. No. I believe Mr. Hayes is an ordinary engineer, not a professor. Secondly, Mr. Hayes starts on a wrong premise; if you start on a wrong premise, you will end with a wrong result. When I heard Mr. Hayes testifying, I could see at once he either was trying to misrepresent the subject or didn't know what he was talking about.

Q. Is it practically a distance of three miles, and by averaging the total change or variation during that distance, to accept the average as a test for the line?

A. If you mean just for a short distance of three miles, consider any rise and fall formula that would give the result for the entire line of railroad, of course not. When Mr. Hayes stated the average change is five feet per mile and that that is small, it meant nothing at all.

Taking up the subject of grades proposed by the City plan extending east from De Baliviere, at present we have a very short grade, about 2,000 feet near the foot of Lindell, climbing to the Grand drive; the City's plan proposes to introduce a grade of the same amount or more leading from Lindell avenue to Kingshighway, which is much further; at that point we meet the same grade [fol. 630] extending 2,000 feet more because we still have to climb that six-tenths per cent grade which has been so kindly provided to us by the City from Lindell to Kingshighway and from Kingshighway to the top of the hill besides.

Q. So that you have an eight-tenths per cent grade in Forest Park for about what distance?

A. In the park only, that is to Kingshighway, that is provided for by the City's plan, that is a distance of 4,000 feet, and an additional grade from there to the top of the hill of another 2,000 or 50 per cent longer; that is east of Kingshighway. It doesn't increase the present grade east of Kingshighway, it introduces a longer grade, which means that much more steam has to be used by the engine in climbing that grade. At the present time we might call that virtually a velocity grade; we can climb that short distance there we have of eight-tenths and then we have a run under Kingshighway, which helps us climb the eight-tenths per cent grade eastwardly.

Just east of Kingshighway and on either side of the Wabash tracks there are located the buildings of Barnes Hospital on the south and St. John's on the north.

The effect on those two institutions by the City's plan in lengthening that grade and in fixing irrevocably that as the grade we have to use will be greater noise and greater smoke.

The Kingshighway bridge over the Wabash was originally built for at least 18-foot clearance; it is possibly seventeen foot nine now, something like that, or less. I have not measured it lately. I [fol. 331] think it is seventeen foot three, much less than eighteen feet.

The reason for that reduction is, in all depressions of the track it always results in the track being raised because water and mud gets into the ballast, and it is pounded down into the dirt and section men come along and raise the track with fresh ballast to get it out of the mud. That always occurs in track work. As an ordinary example of that, in building stations along our tracks, we always place the new platform considerably higher to take care of that very thing that occurs in front of the platform. The track is gradually being built up as it is being repaired and kept in condition.

The City contemplates a clearance of eighteen feet only at Delmar viaduct; in a few years the clearance would be considerably reduced, especially in the depressed track because of the wet soil that is encountered there and from time to time section men will raise that track, and in all probability in a few years it will be a good deal less than eighteen feet, a foot less. When the track is in wet places or in water, the joints are pounded down and the mud comes up around the ties; there is no other method except either dig out the dirt from under the ties and put new ballasting in, which is not practical, so the result is that more ballast is put under the tracks at the joints from time to time; if it is a very wet track, more is applied, which has a tendency to raise the track.

I stated in my opinion a 22-foot clearance is one that should be adopted and that is recommended by all railroad engineers and generally by far-sighted people because of the future. As an illustration of low clearance, one little thing that increases the maintenance where you have structures with such low clearances as eighteen feet, the blast from the locomotives, especially climbing grades, will be tremendous; it has the tendency of wearing away the surfaces underneath the smokestack. That is very apparent under Fads bridge at present. Railroad engineers are trying to take care of that by introducing iron plates to take that tremendous blast; that blast has just the same effect as there would be if you used the same apparatus as is used in cleaning buildings, a sand blast; if you continually use that, you would soon wear it away.

So far as heat and smoke are concerned, it will do no material harm except to make it unsightly.

Grades are being reduced over all railroads, and during the time I have been chief engineer, the Wabash has spent a very large amount of money in reducing grades in many places to four-tenths of 1 per cent. I consider whenever a grade is changed, it should be changed to that grade.

I think the view from the train is of minor importance so far as the City is concerned; that is a matter I wouldn't consider at all in making a plan for entrance into a city.

Q What is the effect, getting to practical matters, of water in

cuts? Take for instance at De Baliviere, where there would be the interlocking plant and junction of the Rock Island and Wabash?

A. It will be wet, as previously explained; there will be water coming up from below all the time, and the conditions will be in-[fol. 633] tolerable, but all that has been gone into. I agree with what the other engineers have said.

The City's offer to build the Delmar viaduct if the Wabash would pay \$200,000 was a trap with a bait. The City knew very well that if that Delmar avenue viaduct were constructed under its plan, that from there on the railroad would have to use the City's plan for future grade separations south of Delmar.

I am very familiar with land along the south side of the Wabash and Rock Island from Union to De Baliviere and along the south side of the Rock Island from De Baliviere to Skinker road. That tract in south of there is generally known as the Catlin tract. The Catlin tract, as I remember it, began at Lindell and continued to Skinker road. It hasn't a depth every place of 550 feet, because close to Union the lots are smaller in depth, and for that reason I think the corner is considerably longer than the other lots.

Q. Do you know about the number of very expensive houses, running up to a cost of \$40,000 or \$50,000, which have recently been planned, some of them are now built, on that Catlin tract, just south of the railroad?

A. Yes, sir. I am not quite sure about whether two of those buildings have been built since the plan of the Wabash to have the track elevated has been a matter of public discussion, I think Mr. Walker Hill lives in one; I don't know the name of the other man. I am not quite sure whether they were built before the track elevation was proposed, but I think they were. I think Mr. Pitzman began to [fol. 634] build up that property; then was the time these two buildings were constructed. After those two were constructed, it was several years before other buildings were constructed, but now it is being developed to its fullest extent, some of the houses costing \$100,000 and more.

I have a sketch here which shows the condition looking southwardly along Wabash tracks and showing the condition of the street and other work necessary if Delmar boulevard is carried over the railroad tracks. This is a sketch made from a point north of Enright avenue, looking south.

Said sketch is marked "Wabash Exhibit 42."

That shows the plan contemplated by the City with the grade separation completed throughout from Delmar avenue to Kingshighway, the only difference between this picture and a picture that would be drawn to represent the elevation of Delmar as proposed by the City elevating the street over the tracks at Delmar only, there is a little ramp with a retaining wall which is not contemplated by the City; when it does that work that is shown on here that would have to be removed, otherwise it is correct by their construction.

I have another sketch showing Delmar boulevard in the vicinity

of Rosedale, showing the effect of the elevation on adjoining property; shows present sidewalk and also future location of sidewalk, the front of the buildings on the south side of Delmar and east of Rosedale and west of the tracks as they will appear, looking southwardly from the north side of Delmar near Rosedale. In Exhibit 42 you will notice that the elevation of the present depot is shown in order to bring out to what a height the street grade would be if [fol. 635] projected over the railroad tracks.

Said sketch is marked "Wabash Exhibit 43."

I have a summary estimate of costs of separation of grades at Delmar avenue, Delmar viaduct, City plan, that is the one proposed by the City as a trap to inveigle—

Mr. Senti objects to remarks of witness as being unfair.

Objection overruled.

That cost will be \$1,624,000, roughly. The separation of grades at Delmar and Hamilton under the Wabash plan will cost \$656,460, roughly, so that the excess cost of the City plan for Delmar alone is \$367,605. That is the excess of cost of City plan for Delmar alone over the cost of the Wabash plan, which would include the separation at Delmar and Hamilton. The separation of grades at Kingshighway to City limits, exclusive of Delmar viaduct, under City plan will cost approximately \$3,000,000, to be exact \$2,992,130. The cost of separation of grades, Grand drive to City limits, exclusive of Delmar and Hamilton crossings under Wabash plan will be \$1,695,702; total excess cost under City plan over Wabash plan under those conditions is \$1,780,283. Total cost under City plan for whole project is \$4,016,198; total cost of Wabash plan, \$2,264,162, so that the excess cost of City plan over Wabash plan for completed project will be \$1,754,033. The details of that summary have been prepared and will be presented by other witnesses. [fol. 635] It is agreed that cross-examination of Mr. Senti by the City may take place later.

Mr. Burns:

Q. Taking exhibits Wabash 27 and Rock Island 1, I ask you as an engineer if this is not a proposition which particularly calls for track elevation rather than depression, owing to the topography and contour of the country, there being a dip through from the east end of both plats, Euclid to Page on the Wabash and Euclid to Pennsylvania on the Rock Island; taking those things into consideration, is it not better from an engineering standpoint to have an elevated plan than to further accentuate the matter by going down?

A. I consider the only feasible plan is the raising of the tracks. I am very well acquainted with conditions and at one time was alderman of University City; I know very well that the Council would never permit that street to be depressed to the amount the City proposes under its plan. At present Pennsylvania is on a very

steep declivity running, you might say, in both directions towards the track, particularly so on the south from Forsythe down north-erly to the tracks. The City proposes to introduce a bridge there. I believe the depression it proposes is seven feet or nine—I am not sure which—more than it is now; if the citizens knew what was contemplated, they wouldn't permit it for one minute; that would mean that that steep grade that the City proposes to reach the summit at the point over Pennsylvania avenue would be very much accentuated if the City plan were followed, so much so I don't believe you would be able to climb the hill.

[fol. 637] No engincer would ever try to put a railroad down in water; one of the first principles of railroading is to keep the railroad track out of water. The general topography leads absolutely towards elevation; anybody can see that.

N. JOHNSON recalled.

Mr. Hall:

Q. You made some estimates of cost with reference to the construction of the grade separation according to City's plan?

A. Yes, sir. I examined the City's plan and took estimates of cost prices in making up the detailed statement of estimated cost according to the two plans which are summarized in my statement.

In getting at cost or unit prices, we first applied tentatively such prices as we thought were proper; then we called in a contracting firm to check these prices and make such alterations as were considered advisable in doing work of that kind; the firm is Fruin-Conlon Contracting Company of St. Louis; that is a very large contracting firm. I had the benefit of consultation and advice of some representative of that firm, Mr. Bowen, who is here today.

Those estimates I prepared in detail relate to the separation of the crossing at Delmar, according to the City's plan, involving a total cost of \$1,024,065. I also made an estimate of costs of separation of grades at Delmar and Hamilton according to the elevation so-called "Wabash plan," involving a total expenditure of \$666,460, the difference being \$367,605 as excess cost of City's plan over the Wabash or elevation plan.

[fol. 638] In making up this estimate, I included items which in my experience as an engineer were necessarily included, but which had been omitted from the City's estimates. There were other items that were somewhat doubtful as to what they might be, depending on method possibly in which the work would be conducted, and for that reason as long as they were somewhat in doubt, we did not include them in the estimate. Under some methods of construction there would be temporary runovers, which would cost additional money to construct and maintain.

The City's plan contemplates using the Rock Island right of way in that territory, but nothing has been said as to cost or price which the Wabash might have to pay for such use; we have not included

that inasmuch as at present at least both companies are operating through there and it was one of those doubtful things which we didn't know what the future would hold, consequently we left it out; it might be an item of expense, however.

Q. But the City plan contemplates the use of the Wabash right of way through there?

A. The Rock Island right of way, but it makes no provision for compensation to the Rock Island. The City's plan also takes the railroads to the City limits and leaves them there at a different grade from their present grade, both the Rock Island on the west and the Wabash on the north.

Q. Would there be a considerable item of expense involved in adjusting your tracks at the City limits according to the new grades to the necessary grades in order to operate the railroads in both instances?

A. There would necessarily be considerable expense; just what [fol. 639] that would be is impossible to determine until it is decided what will be one north of the City limits, which is outside of the jurisdiction of the City. The City has not taken into account in its estimate those items of inevitable cost.

Q. The City's plan provides for a clearance of only eighteen feet at the viaducts over the railroad, assuming that this Commission should order a clearance of 22 feet in accordance with the usual custom and requirements, would that involve a considerable in cost of construction?

A. It would involve a tremendous increase, not only in the construction but it would change the grade lines and it would change the whole plan. Of course, every foot of added clearance under the viaducts would mean an added and very substantial increase in cost. The only plans I have seen submitted by the City has 18-foot clearance. The estimates I made are based on that clearance.

Q. The City's plans contemplate the relocation of the Grand drive in Forest park, necessitating the tearing down of the bridge and rebuilding of the roadway over the railroad tracks. Has there been any estimate of that item of cost in the City's plan?

A. Only of the new proposed viaduct over the railroad carrying the Grand drive, no work in the park has been estimated outside of the bridge itself. There was nothing shown in the City's plan for the temporary paving of Delmar avenue; I think it would be one of the contingencies that would have to be taken care of because we think it would be impractical to put a permanent paving on green embankment. The City's plans do not provide for any [fol. 640] piles under the retaining walls; it would be necessary to have piles there on that ground on account of the nature of the soil. We have included that in our estimate, but the City did not include it in their estimate.

With reference to the effect on the adjacent property, to make that property useful for the class of improvements you would expect in that territory, it would have to be filled up approximately to the height of the new Delmar grade, possibly sloping back to the alley; they would require a considerable fill and it would necessitate ex-

tending all your foundation work for buildings down to the original ground; it would not be safe to place such foundations on the new fill; it would be necessary to carry foundations down to solid ground; that would mean a foundation of twenty feet, fully twenty-two feet in the worst places.

In excavating for the building of a wall or putting in of a foundation, they would have a good deal of trouble with material caving in, have to be shored up and all the way down it would be very expensive for excavation on that account, much more so than if it was on the old original soil. That certainly is a proper element to take into account with reference to the damage to the abutting property.

Q. Was that item taken into account so far as you have been able to find out in the testimony or estimates made by Mr. Hemmelman?

A. I didn't see any item of that kind. We find that the property damage would be considerably greater than the estimate made by Mr. Hemmelman. I make a total estimate of property damages including estimate for legal expenses, if necessary, of \$240,000. I don't remember his exact figures.

[fol. 641] Q. Do you recall the estimate of damage Mr. Hemmelman made to the City's property on the north side of Delmar between Rosedale and the Wabash tracks which the City bought at a cost of \$10,000, and which Mr. Hemmelman estimates after it is filled up by dirt to be taken from the Wabash cut would be worth about \$27,000 only, or a difference of about \$13,000 damage that would accrue to the City's property?

A. I remember there was something in one of those estimates on that, but I don't recall the figures because it would hardly be practical to fill up that ground north of Delmar and west of the railroad tracks from excavation taken out of proposed cut south of Delmar after the Delmar avenue bridge has been built; it would be inaccessible.

The City's plan did not take into account at all any temporary relocation of Delmar to take care of the traffic during this period of construction; according to the City's plan, traffic could apparently find itself a way out where it pleased or could; there was nothing provided that I could find. In my estimate I have provided a temporary location of a Delmar avenue to care for traffic ordinarily going across there during period of construction. In our estimate we have taken into account the probable cost to public utilities using that, so far as it could be ascertained. The water pipe was taken into account by the City, not the other utilities.

We have included the item of the Bell Telephone Company in this expense.

Q. The City's estimate is based upon acquiring about 50 per cent [fol. 642] of the earth required to make fill as a donation; have you calculated on a basis of donations of that sort?

A. I don't recall the percentage they assumed to be donated, but in our estimate we have not assumed any donations; it has been our experience that we don't get any donations in construction; if we

did, somebody would have to pay for it; it would be part of the cost even if it was a donation, and in consultation with this contractor who has been called in on this, it is his experience that you cannot rely on any donations; if he was taking the contract to do the work, he would base his figures on the supposition that he would have to produce the material himself.

Q. Suppose the City could get a donation of about fifty yards of dirt a day to its work there, it would take about three years to get half the earth there by that process of donation without cost, fifty loads a day?

A. I expect it would; I haven't figured that accurately. It would greatly delay the work if the City was depending upon donations of earth.

Q. As suggested by Mr. Senti, state the date as of which your computations were made in these estimates?

A. As far as prices were concerned, we used the period as of about last March at the time of the last hearing in order to make it comparable to the City's estimates, which were based on about the same period.

S. W. BOWEN, being duly sworn, testified as follows:

Direct examination by Mr. Hall:

My name is Sherman W. Bowen; I reside in St. Louis. I am con-[fol. 643] struction engineer with the Fruin-Colnon Contracting Company and have been with them about six years in charge of the preparation of bids and the construction of work in the field.

We do a general contracting work, bridges, viaducts, earthwork, roads, almost anything in the construction line; we have built three viaducts in the City of St. Louis, the Twelfth street, the Compton and Union avenue. We have also completed a number of industrial buildings in the northwest territory, one for the Garrett-Win Company, one for the Bridge and Beach Company and one for the National Lamp Works; we refer to those three in the row up there on Union; we have also done a great deal of other work around the City and in this district.

We do not confine our operations altogether to the vicinity of St. Louis; we have built viaducts at Lake Charles, Louisiana; Tulsa, Oklahoma; built the water plant for the Louisville Water Company; the electric light and power plant for Little Rock, Arkansas.

I have done a large amount of work outside of St. Louis. I have been connected with construction work since about 1895, except for four years I was in Washington University taking civil engineering. I am a graduate of Washington University in civil engineering, class of 1901.

Previous to coming with Fruin-Colnon, I was with the consulting engineering firm of Brennecke & Fay of St. Louis; I was with them for about thirteen years; during three years of that time I was in [fol. 644] direct charge for them of the construction of the main spans and west approach of the Free Bridge, the Municipal Bridge

at St. Louis. A good part of my time was spent on the job; not all, however. About or a little after this time we had four large reinforced viaducts at Fort Worth, Texas, which I designed and was in general charge of construction.

Q. Something has been said in the testimony with reference to the accuracy with which the City has been able to estimate the cost of work done by it. As a matter of fact, what was the increased cost of the construction of the Municipal Bridge over original estimate of the City?

A. The total cost is about twice the original bondage, but I won't say that would be due to any inaccuracy of the City estimating it; it could be due to changed conditions. It means there were a great many things which could not be foreseen.

Q. Did you have anything to do directly with the Union avenue viaduct, which has been mentioned?

A. I happened to be on both sides of the fence on that job. I designed it just before I left Brennecke & Fay and afterwards I came with Fruin-Colnon Construction Company. I didn't have anything to do with the construction of it for Fruin-Colnon, but I designed it. It was a viaduct raising Union avenue over the Terminal tracks in St. Louis. I believe the construction started in 1913 and was completed some time late in 1914, a little over a year; that included two construction seasons.

Q. What was the experience that was encountered with reference to settling of the earth in that fill?

A. There was a very considerable settlement at a certain point [fol. 645] where the fill was deep, the paving had to be left off for some time, and after it was put on there, there was a further settlement. I am not positive how long it was before an attempt was made to install permanent paving, but I should say over a year. That viaduct is supported by concrete retaining walls perpendicular on either side. That sort of construction settles more quickly than one in which there is merely a slope to the side, because with the slope there is more chance for lateral movement of the material, more chance to move out sideways. In my opinion, I would say the method proposed by the City would require a greater length of time for the viaduct to settle than if there were involved retaining walls that held it in place.

"Wabash Exhibit No. 44," marked.

This Exhibit 44 is a view of the Union avenue viaduct looking northwesterly at the structure.

In my judgment a temporary paving on a viaduct such as Delmar, if constructed according to City plan, would be necessary. In view of the traffic on that street that the street is intended to take care of, I would say it was absolutely necessary. If a temporary paving is used where a permanent pavement is contemplated, it would cost probably in the neighborhood of \$20,000. I don't think any estimate of that has been made by the City. I haven't seen it.

I have had experience in excavation work where we encountered

water. I had such an experience at Granite City, and I have had experience of that on this side of the river.

[fol. 646] Q. What was the effect upon the length of time required and the cost of the work where that condition is encountered?

A. It increases the cost of the work very materially and increases the time.

In sinking the main piers in the Twelfth street viaduct to rock we found considerable difficulty and experience in putting down the piers for the reason that they were rather small and cross section, I think three or four feet by possibly seven or eight; I don't remember the exact figure, by the time we got to shoring and bracing in place and a bucket to hoist out the material and a pump to keep the men from drowning there was not enough room for the men to work, and it took considerable time and the cost was rather high.

It didn't seem to me that the City's estimate of cost, that their unit price was sufficiently high.

We don't take into account the donation of earth unless there happens to be some large job in the vicinity and we are assured we can get the dirt by making arrangements ahead of time with the excavating contractor on the other job. In the absence of such assurance we take no account of it.

Q. Would you say the estimate made by the City considering the free dirt they have relied upon, would be a conservative and dependable estimate for calculating the cost of this work?

A. Under the conditions obtaining now and which have existed for the past year it would be hardly safe to assume that you would get very much free dirt. If they could get fifty loads a day that way, it would take a couple of years anyway to get the 50 per cent the City is relying upon as free dirt.

[fol. 647] In making my calculations as to cost prices I made them late February or early March, late in the winter or late in spring, making them comparable with the dates used by the City. In my estimate I took into account a relocation of Delmar to take care of the traffic there during the period of construction. I would think it was not only expedient but necessary to make some provision for carrying that traffic. We made a temporary layout for a roadway starting at about the Park Theater or Pershing, extending parallel to Delmar and along the north side especially far over until it clears the slopes of the earth embankment and across the River des Peres on a temporary wooden structure, moving present station out of the way to the north to clear this and coming back into the line of Delmar after reaching the west end of the viaduct. This roadway was to be graded and temporarily paved and the street car tracks moved over on to it. I estimate the cost of temporary location at \$65,000, including restoration of property on which the relocation was made. I don't think there is any estimate of that by the City. I take into account the cost of the United Railways, putting their new tracks and maintaining them for some time on the green fill. In making necessary changes I think the cost to the Telephone was mentioned before. I also include the gas and electric light utilities there.

I made a memorandum of some of the principal items which go to make the difference in cost over the City's methods.

Q. They go into this total of \$1,432,200, which estimate would [fol. 648] be the City's cost according to the City's method?

A. Yes, sir. That is the cost for the Delmar project alone.

I have made up a statement of unit prices which I used and in my judgment should be used in making the estimate of that work.

Said estimate is marked, "Wabash Exhibit No. 45."

That statement is based upon my experience as an engineer and in the work that I have already testified I have been engaged in.

Mr. L. R. Bowen:

Q. Will you bring out how much of the estimate is due to the witness and how much is due to other persons, and whether they are unit prices or quantity prices?

A. These are all unit prices, as made by me, and the quantities were computed by the Wabash Railroad Company's engineering force.

C. P. RICHARDSON, being duly sworn, testified as follows:

Cross-examination by Mr. Burns:

I am 39 years old; I live in Chicago and am connected with the chief engineer's office of the C. R. I. & P. Railway at Chicago. I have had a great deal of experience with that company in the matter of separation of grades and make that a special study.

I am a graduate of Dartmouth College and also a post graduate of the School of Engineering, which is affiliated with that college. My railroad experience has been between 14 and 15 years.

I have had eight years' experience in grade crossing elimination work in Chicago, devoting my entire time as resident engineer in [fol. 649] direct charge of construction work, as well as preparation of estimates dealing with public utilities prior to and during the execution of the work. This was preceded by five years' work out of St. Louis and vicinity with the Missouri Pacific Railway on drainage, maintenance and construction projects of miscellaneous nature. The grade separation work I have been connected with and in responsible charge of has amounted to approximately \$4,000,000, and putting that into the terms of war-time prices it would amount to 50 or 75 per cent greater.

I am familiar with this grade separation plan prepared at St. Louis of the Wabash at Delmar and vicinity. I have looked the whole plan over in connection with the Wabash and Rock Island engineering departments, together with a general knowledge of the territory and examination since the plans were prepared. I have been quite familiar with the territory involved after being in that vicinity for five years or more in that line of engineering work.

Q. How does this project of Chicago, which you spoke of being connected with, compare with the work involved in this proposition?

A. The amount of work there exceeds this project, the Seventy-ninth street grade separation was a larger project. It was at Seventy-ninth street between Halstead and Wentworth. As to keeping traffic moving during time of construction it was at least as big as this one. Traffic was heavier in Chicago, but we were elevated. So far as railroad traffic is concerned, it was busy. Present completed work is four tracks of the Rock Island and a gateway for approximately ten or twelve roads. Yes; operation was maintained during entire construction; that is a two-deck grade separation, not a separation [fol. 650] between railroad and streets, but a combined separation separating railroad as well as streets. A three-level separation.

I have gone over the Wabash estimates on this grade separation proposition in line with figures presented by Mr. Johnson and Mr. Bowen.

As a result of my experience and actual examination of the work the estimates, I think, were extremely conservative as has been brought out up to this time. There are several items of expense which could not be directly allocated or be omitted. No provision has been made for delays and tieups due to working together with public utilities. No expense has been included for temporary street openings, changed conditions or any temporary suspension of work; no provision has been made for such contingencies. It is also presumed that the work would go ahead without delay and the time period has been very conservative.

Q. All those items, gas, electric lights, water mains, all public utilities, are proper to be considered in a proposition of this kind?

A. They are; of course.

Commissioner Bean:

Q. They have to follow the streets?

A. Yes; and not only that, they have to remove their pipes and conduits where railroad construction interferes with it; that is where the greater part of the expense and delay comes.

There is also the question of property damage, which might not have been considered in the City's figures.

I haven't in mind at present the items adding to those mentioned, property damage and some others. Experience shows that, during the construction of projects of this sort where, of necessity, the public [fol. 651] is put to great disadvantage, due to special conditions, unforeseen expenses are called for to remove obstructions to the use of the highways by the public. Practical experience demonstrates the necessity of including such items.

Q. How long would it take to complete the Delmar separation alone, according to City's plans of building a viaduct over the tracks and extending the street on each side of the track above grade?

A. My opinion would not be worth as much as others; I would say, two working seasons. It would take three or four years for the whole work outlined by the City plans if everything was all ready to go ahead.

As to a comparison of depression and elevation, that has been ex-

pressed previously. I concur in many of the remarks that have been made. I call attention to that dip in the topography, which is, as I recall it, 40 feet on the north and 25 feet on the south, the distance between the two extremes of grade separation territories, that is, from Kingshighway to Page avenue. That is about Euclid on Wabash Exhibit No. 27; it is about 1,000 feet south of Euclid. The depression scheme, on the face of it, increases that dip from an additional 20 feet, where the elevation decreases this dip the same amount; this must stand out very strongly in comparing the two methods, let alone the adverse operating conditions in a depressed railroad. There is nothing new about that; there is ample experience to know what that expense would be. I would say that that is also true of the Rock Island but not nearly as unfavorable on the Rock Island as on the Wabash.

Q. But the same dip exists on the Rock Island; it accentuates the [fol. 652] dip, whereas, if the elevated plan should be adopted, it would give a steady grade westward of a much less grade?

A. Yes; as the exhibit shows on both elevations, four-tenths per cent grade on both railroads, whereas, on the depression scheme, the maximum is exceeding the one per cent required.

I would say from my experience that the topography of the country lends itself to an elevated rather than to a depressed grade; furthermore, I have very exhaustive studies comparing the cost of operating on a five-tenths grade and seventy-five-one hundredths of one per cent grade in grade crossings.

From the experience I have had, I always believed and maintained we could not afford to exceed a five-tenths per cent grade even in a three-level base approach. I would consider an eight-tenths per cent grade very excessive, although if it were a short grade it could be neglected, but this is not the case in this particular project.

Q. What is your experience as to grades in terminals as to having them lower than five-tenths of one per cent?

A. It is a case of economic operation; it is called a switching district and any length of grade is uneconomical for operation. The ideal proposition is to get that level, if possible, without a grade, and the idea of all engineers is to get the reduction of grades as low as possible. That is true of a plan of this kind, and any engineer would say it would be better to have an elevated track than depressed, which would make the grade steeper.

Q. I believe no detailed estimate was given as to getting the Rock Island out of the depression from De Baliviere west. From your experience and from your investigation, what, in your judgment, [fol. 653] not having detailed estimate to go on, from the City's standpoint, would be the reasonable expense in getting the Rock Island out of the cut on the De Baliviere, assuming the cut was made there where it joins the Wabash at present, and carrying it on west on proposed City grade, as shown on that map, and by the City's Exhibit 53?

A. I would roughly approximate that expense as between \$500,000 to \$550,000.

Q. If the Wabash should cancel present contract, permitting us to use tracks, that 3,500 feet in there would still add to the expense of the Rock Island, being down in that cut, would it?

A. That would increase the estimate; it would make the connection at Union instead of at De Baliviere.

I haven't given the matter of the effect of a 22-foot clearance instead of the proposed 18-foot clearance much study; in my opinion, a 20-foot clearance practically makes the depression scheme impracticable. If you take the tracks down an extra four feet, your drainage situation is aggravated to an extreme, as well as the great increase in cost. If you raise your viaduct to get that extra four feet, you have a condition that could not offer any advantages over the track elevation. Therefore, taking the 22 feet, it removes the greater part of any advantages that might be expected from track depression.

My judgment as an engineer is that there is no comparison between track elevation and the proposed depression at Delmar. I might add in that connection to what I said about drainage. The Blackstone sewer sticks out as a very strong feature in lowering the tracks any further.

Q. Are you familiar with the building being built adjoining and [fol. 654] adjacent to the elevated in Chicago, as testified to by Mr. McPherson the other day?

A. Yes, sir.

Q. Is there any objection being made, so far as you know, to those elevated tracks claiming it mars the beauty of the parking district?

A. I have never gained such an idea from my experience. There is no comparison with depressed tracks; I have no information on the difference of feeling, but the general feeling has been to get the tracks out from the ground and it is considered an improvement to the property rather than a detriment.

I am familiar with the high-class apartments and residences building there. Of course, I appreciate that the residence district is on the north side of Chicago and the Rock Island enters on the south side through the industrial district.

I am familiar with the fact of these high-class apartments along Sheridan road. The Northwestern and the Milwaukee tracks are in that direction. The Illinois Central tracks are in Jackson Park; the Rock Island passes Hamilton, and I might say, during track elevation there was a big ditch there that went down from the railroad about 15 feet and then up again into the park.

Arrangements were made between the railroad and the Park Commissioners to fill that ditch and make a rounding embankment along that park for a distance of about 1,200 feet and it is a very great improvement. It is really a very admirable looking spot where the old ditch was, covered with sod and shrubbery. It has been my experience that, although the City of Chicago does pay the reasonable damages, it is a several year period before the buildings are adjusted to the changing grade of streets. There are war-[fol. 655] time buildings where streets are depressed in Chicago that have been boarded up for the past five or six years and they

presumably will stay in that condition until somebody buys the property, my idea being that the owner takes the money and uses it for other purposes. That is true of Lake street near Rush Street bridge when abandoned, but, at the same time, there has been a lot of construction there.

When an elevated structure is put up in a great many instances the property is built up to the elevated structure. In construction work it is advisable to get an easement for poles of retaining walls in order to utilize the full right of way, and it has been a very insistent idea from both residential and industrial to get a right from the railroad company, in their contract covering this easement, to put their foundations on top of that wall to enable them to develop the property right up to the railroad right of way. It is common practice.

Mr. Hall: The Wabash introduces in evidence Exhibit No. 46, being the estimate of cost testified to and identified by Mr. Johnson; the cost of construction of Delmar avenue viaduct according to the City plan; separation of grades at Delmar and Hamilton according to the Wabash plan; separation of grades from Kingshighway to the City limits, exclusive of Delmar viaduct according to City plan and the separation of grades from Grand Drive in Forest Park to the City limits, exclusive of Delmar avenue and Hamilton avenue crossing according to the Wabash plan, with a summary of the estimates.

("Wabash Exhibit No. 46" marked.)

Hearing adjourned until further notice.

[fol. 656] STATE OF MISSOURI:

Public Service Commission

Hearing at Jefferson City, Missouri, Feb. 6th and 7th, 1922.

Present Edwin J. Bean, A. J. O'Reilly, Commissioners.

Appearances:

For the Complainant, Messrs. Geo. F. Haid, Oliver Senti.

For Defendant Wabash Railway Co., Mr. Homer Hall.

For the Intervenor, West End Grade Crossing Association, Mr. C. H. Rodehaver.

IN REBUTTAL

ALEXANDER B. COOK, being duly sworn, testified as follows:

Direct examination by Mr. Senti:

I live in Cleveland. I am in charge of the Bridge Department of the City of Cleveland. I have been connected with the City Government of the City of Cleveland from 1905 to present time.

From 1905 to 1910 I was employed by the City, had charge of the survey gang on grade elimination work, bridge work, staking out foundations and looking after construction work generally; from 1910 until 1913 I was in charge of all the survey parties employed by the department; in 1913, I left the office to become a resident engineer in the construction of the Clark avenue viaduct; that is a viaduct about 6,700 feet long; I remained down on the job as resident engineer until 1916, when the major portion of the work was completed; I returned to the office then and again assumed charge of the field parties and outside work, execution of contracts on construction work, and general office assistant to Mr. Richards, who was Bridge Engineer. On Jan. 1, 1920, Mr. Richards resigned and since that time I had charge of the department.

Q. It has been stated by one of the witnesses who previously testified in this hearing that about 80 per cent of the grade elimination work in Cleveland has been brought about by elevating the railroads over the streets. State whether or not that statement is true.

A. That is not the fact. Of 53 structures built in connection with grade elimination, 29 have been highway bridges, 24 have been railroad bridges; of the 24 railroad bridges, 13 have been accomplished by elevating the railroads, the other 10 are railroad bridges, the railroad remaining at exactly the same grade which it did prior to elimination, the street taking the entire depression.

Q. It has been stated that the railroad tracks in the City of Cleveland have been elevated in the residence sections, particularly near [fol. 658] Euclid avenue, state whether that is true?

A. The Pennsylvania does not run through any residential district at all; there is a belt of considerable width on both sides of the Pennsylvania which is individual solely, with the possible exception of East Fifty-fifth and Euclid, which is business, and about 500 feet southerly on Fifty-fifth street from the intersection of the Pennsylvania Railroad, we have the beginning of an apartment house section, but other than that the conditions are as I stated. There was no track elevation at all in Cleveland in the residence section.

Q. Have the tracks in Cleveland been elevated in any of the city parks?

A. Not above the grade at which they originally entered the City. There is one railroad, the Lake Shore, which runs along the southerly boundary of Edgewater Park for about half the distance that Edgewater Park runs easterly and westerly; the location of the railroad at this particular point is at the southern boundary line of the park; the Nickel Plate crosses a park at East boulevard and the New York Central again crosses Gordon Park; all of these railroads cross the parks at the original elevation which they had at time of construction; there has been no change of grade on these railroads at these points.

Q. Since 1916 have you been in close contact with any particular grade separation project?

A. Yes, the Nickel Plate depression from Fulton road to Detroit avenue. I have represented the City on all the construction work,

have been out there every day and have also represented the city in the determination of the part of the cost of the entire project which the city would bear.

[fol. 659] The Nickel Plate was a double track railroad in Cleveland prior to grade elimination; now we have eliminated that and are arranging for a four-track system and are laying a four-track system and have built our bridges for an eight-track system and the new Union Terminal's project provides eight tracks there within the next five to ten years. The Nickel Plate in the City of Cleveland has recently been depressed. The entire improvement is about 12,000 feet long; the depth of depression on either end is zero and runs to a maximum of about 22 feet at West Sixty-fifth street. About 30 streets were involved in this elimination project. The track was depressed below ground water; we encountered ground water in our excavation at about 8 feet originally. The cut was carried below ground water from zero to 12 to 14 feet; we are below ground water at least 10,500 feet. We did not experience any difficulty by reason of ground water in making the excavation.

The price of excavation per cubic yard was 26 cents; that was done by contract.

Q. What provision, if any, was made for taking care of the ground water?

A. We built a sewer which varied in size from 36 inches at West Fifty-fifth street, which was the low point of the sewer, elevating both east and west at a depth of about 20 feet at West Fifty-fifth street, and this sewer ran up so that about 500 feet westerly from Eighty-fifth street it was about four feet in depth and at West Fortieth street, the easterly end of the job, it was again four feet in depth; this sewer was used both as a storm water sewer and as a sanitary sewer for the intersecting street sewers, and directly above [fol. 660] this sanitary and storm sewer we put in an eight-inch seepage drain; we back-filled the sanitary sewer up to the underside of the seepage sewer with clay and above the seepage sewer back filled the entire stretch with cinders.

This has permanently lowered our water plane from about 8 feet 6 to 8 feet below the original surface to about 6 to 8 feet below our present subgrade.

It is not a fact as testified that the Nickel Plate has experienced difficulty from sliding banks and has begun to construct a low retaining wall along the slope; the only retaining wall we have built is along Pear avenue, just east of West Seventy-fourth street, and it was originally planned so that we might take away any portion of sidewalk of Pear avenue.

We originally adopted a 16-foot 3-inch overhead clearance and the improvement was built with 17-foot clearance by request of the railroads.

The approximate cost of this elimination project as close as we can figure now with about 85 per cent of the work completed, will cost \$4,100,000.

I have read the Ohio law fixing the division of the cost of grade eliminations. The Ohio law provides that the city bear 35 per cent

of the cost of reproducing the existing facilities of the railroad at time of grade elimination.

I worked out for the City of Cleveland the application of the law to the project I had reference to.

Q. How was the cost apportioned there?

A. The total excavation was made for a four-track system. We took out the trapezoid which would have been required for a two-track system and participated in the cost of that at the same unit price which we had for the entire project; on bridges the railroad [fol. 631] company pays for everything excepting the two abutments and the span of the floor which would have been required for the two-track system; if my memory serves me correctly, we participated in 34½ feet of floor span, while the Nickel Plate assumed 100 per cent of the cost of 93 feet of the floor; the railroad company pays the entire cost of the three piers and all columns; on land the city participates in the cost of acquiring the land which would have been necessary for a two-track system only; when the same parcel of property is required for a four-track system as is required for a two-track system, the proportion which the city bears is in a direct ratio with the area required for two tracks as against four tracks; where there is a residue remaining from property which has been acquired by reason of both the two-track and the four-track scheme, the railroad company buys that residue at a price that we have fixed, and that price has been decreased by reason of the fact that usually the property remaining is just a very narrow strip. On damages to adjacent property we pay 35 per cent of the entire damage; on pavements, retaining walls, sidewalks, railings, exclusive of bridge railings, we pay 35 per cent. On approaches to the bridges we do not pay for any of the paving on the section of the floor span which we do not participate in; we only pay for bridge railings for the length of a two-track bridge.

I have made a study of property adjacent the depressed tracks in Cleveland to determine the effect of the depression on the value of the property. I have made a tabulation to show the effects of the depression upon the assessments. I took the figures shown by our [fol. 662] County Auditor as a basis of the tabulations I made; they are the figures used for determining the tax per property and are known as our tax valuations; I took an area of about 300 to 400 feet wide on each side of the railroad cut from Fulton road to Detroit street, on both sides of the railroad I took the valuations as shown by the Auditor in 1910, in 1917, when there was a reappraisal and again in 1920 when there was another reappraisal; have listed these individually parcel by parcel.

The improvement was begun in the fall of 1916; that is, actual construction; we began our excavation on the east end of the work in the fall of 1916 and proceeded westerly and the entire excavation had been completed by the middle, or say September, 1917. The first appraisal was made prior to making elimination of crossings and the second was made at the time the excavation was made. I have a subsequent appraisal.

Q. Have you any plan or map there showing the property embraced in the summary which you have? You have that with you?

A. Yes, sir.

(Said paper was marked City's Exhibit 125.)

Q. State whether or not that sketch embraces all the property within the area you described as being 200 feet or so on each side of the improvement?

A. In most cases, yes; in cases where I thought we should get figures beyond the point where the lot lines are shown I have inserted lot lines, in some cases I just inserted the figures showing the sublot numbers, the foot of frontage of each of those sub-lots and the valuation figures as shown on the other surrounding property.

[fol. 663] Q. Are these figures which you have reproduced here the values of the land or the land and improvements combined?

A. On the map they are the totals, land and buildings combined; for my tabulations and comparative purposes I have taken land only; the reason for that is that often there are new buildings built with the territory affected, also buildings torn down, and the time was not long enough to allow me to go into the various deductions and additions which necessarily have to be made in order to get a fair comparison.

(Said tabulations are marked "City's Exhibits 126 and 127.")

On the streets directly within the improvements, by that I mean on streets which are carried over the railroad by highway bridges constructed prior to 1920, I have listed all that property separately and find in 1910 the valuation of that land was \$103,290; in 1917, same parcels were worth \$106,150, or an increase of 2.8 per cent over 1910; in 1920 those same parcels were appraised at \$145,280, of an increase over 1910 of 40.7 per cent and an increase over 1917 of 36.7 per cent. On all other property within the belt that I previously described, that is on streets which were vacated across the railroad, on streets which ended at the railroad, on streets directly parallel to the railroad and adjacent to it, and on streets which will have bridges and which will be affected by a change of grade, the property that I have taken there was assessed in 1920 at \$403,245; at 1917 at \$431,770, or an increase of 7.1 per cent over 1910; in 1920 that same property was assessed at \$611,050, or an increase [fol. 664] over 1910 of 5.15 per cent, an increase over 1917 of 41.5 per cent.

The figures which I have testified to and the details from which the aggregate figures were obtained are contained in the sheets attached to the summaries; they were all taken from official records of the county.

The two tabulations cover every piece of property within the area described and for the entire length of the improvement. I modify that last statement—nothing west of West Eighty-fifth street on the north side of the railroad has been considered because that is an unallotted section and is altogether manufacturing, and the figures

that appear on the duplicate didn't seem to me should be included in this total because this entire tabulation deals with residential property. The details attached to the summary include the value of improvements as well as of land, the buildings and property together give the total which I have shown on the map, but in the detail they are listed separately.

Cross-examination by Mr. Hall:

I have been employed by the City of Cleveland over 16 years. I am at present in charge of the bridge department of Cleveland, bridges and grade eliminations. I took that position Jan. 1, 1920.

Q. Have you been constantly at work for the City of Cleveland since that time on that work? When did you make up this tabulation: when did you find time to examine the records of the City of Cleveland for the years 1910, 1917 and 1920 to accumulate all this data included in Exhibits Nos. 126 and 127?

A. Since a visit to Cleveland by Mr. Bowen requesting that information, about four weeks ago. That information is not derived from the records of City of Cleveland, but from the County of Cuyahoga, in which Cleveland is situated, and is in map form.

Q. Did you get the information yourself?

A. I either got the information directly or proof-read it, yes, sir. I mean by proof-read it, had one of my assistants call off to me the figures that he had tabulated and I followed the map from which he took the figures.

Q. Then this is made up from tabulations that were made by some other person, is that not true?

A. Not entirely; no, sir.

Q. What percentage of this work you have presented here as your statement of the increase of land values adjacent to the railroad was made up from your own personal investigation?

A. For purposes of determining its accuracy, 100 per cent.

Q. You took all these figures that were brought to you and then went back to the records of the auditor of Cuyahoga County and checked and verified them, is that what you mean?

A. I do not mean to say that at all. I mean to say I went over to the auditor's office while my assistant was at work there and took the tabulations he already had, had him read them to me and followed the map as he read them, and in that way I could check in about an hour a day all he had done the day previously. There is one matter I did not check; I did not check whether he was reading the figures to me correctly.

Both of these exhibits are along the Nickel Plate Railroad from Fulton road to Detroit avenue.

Q. Is the Nickel Plate Railroad the only road that runs through depressions in Cleveland?

[fol. 666] A. There are other railroads which have highway bridges as their solution of the elimination problem. By "depression" do you mean a continuous depression or an isolated depression?

Q. The Nickel Plate of course does not run through a continuous depression, does it?

A. Through the portions of the railroad which have been eliminated, yes.

Q. Does this map you produced here, this valuation map show the Nickel Plate is depressed the full length of that map?

A. With the exception possibly of a few hundred feet at either end, yes.

Q. Then there are no places except at either end where the railroad goes over the highways; is that correct?

A. That is correct.

There are no other railroads in Cleveland that run through a continuous depression.

Q. What is the longest depression any road runs through? Let's say that we mean by depression where the railroad runs in a cut or at an elevation below that of the surrounding territory?

A. Combined with that do you mean also railroads which were originally built in that position? You must remember we have a large valley through which some of our railroads go; the surrounding property on each side of those railroads is higher. If by "depression" you mean the fact that a railroad has now a lower roadbed than it had when it originally entered the City of Cleveland, I would answer that question "none." Barring the Cleveland Short Line, which runs through a depression of about 6,000 feet in length, and which is the last railroad built in Cleveland, I don't recall any other than those which run up through the Cuyahoga [fol. 637] Valley, which is a natural depression. On the southerly side the Big Four from West Fifty-third street to West Forty-first street, there is a depression of, I would say, 1,500 feet, a little over a quarter of a mile; the Big Four runs through some territory the northerly side of which is higher than the Big Four right of way from East Thirtieth street, rather West Thirtieth street to West Twenty-fifth street, a distance of about 800 feet. Those are the only depressions I recall other than railroads running up through the valley.

Q. Of course, that is a valley, not like a railroad cut dug through with limited sides and area; that is not that sort of depression, is it?

A. Both the Nickel Plate depressions I refer to fill exactly the same conditions you just described. I meant the Big Four, not the Nickel Plate. The Cuyahoga Valley isn't like a cut such as a railroad builds when it is building its track. Those are the only ones I recall at present.

I should say there are ten or twelve railroads in Cleveland. I don't know how many miles of track they have; somewhere between 200 and 300 miles.

Q. What is the mileage of which that goes through depressions, any kind?

A. I would say about four miles in length.

Q. Tell the Commission, please, how the other 196 miles get over the streets in Cleveland?

A. On the surface, with the exception of the Pennsylvania, which

goes through on an elevated structure, excepting five of their crossings, which cross at grade.

I should say about 75 per cent of the crossings of highways and railroads in Cleveland are separated. Our topography is not level by any means.

[fol. 668] Q. And many of the places where the highways have gone over the railroads it is because of the topography of the country, is it not?

A. I wouldn't answer that question quite that way; no, sir. I wouldn't say in "no instance;" you asked me if it didn't happen in many instances.

Q. In how many instances have the highways been carried over the railroad tracks solely because of the topography of the land? I mean because the situation of the street and the elevation and grade of the streets is such that it is practical feasible thing to carry it over? To raise the grade of the street over the railroad?

A. I should say that street grades were the controlling factor in eight out of our twenty-nine highway bridges built in connection with grade elimination.

I stated that the Nickel Plate is not a single-track railroad. I did not testify regarding anything except inside of the City of Cleveland; I think the question is, is the Nickel Plate Railroad a single-track through the City of Cleveland, and my answer was no; it is not.

Q. The New York Central is a four-track railroad. As a matter of fact, you don't know whether the Nickel Plate is a single-track road or not outside of the City of Cleveland?

A. Outside of the City of Cleveland, I don't know.

Q. Do you state the Nickel Plate has not had any difficulty with earth sliding in its cuts in the City of Cleveland?

A. The question was asked me whether we are building any walls because of that; I answered "no;" there is a little sloughing, due to rain water on streets where the final grades have not been made yet; [fol. 669] also a trimming up is needed, but that is a very small job; in 99.9 per cent of our cases our banks are holding up in first-class shape, at least as well as could be expected from a cut of that size.

Q. As a matter of fact, the Nickel Plate has experienced that sliding of the cuts in places?

A. No; no; I wouldn't put it near as generally as "sliding of the cuts in some places;" I would say a little sloughing off at some few points and crevices, caused by surface water not being under control.

The city and the railroad company put that job in an acceptable condition to the railroad company and to the city before the maintenance costs of the various parts devolve upon the corporation which ultimately takes maintenance; that sloughing off I described from the original excavation must be taken care of as a grade elimination project because we feel it is due to the original disturbance; when I used the pronoun "we" I do so because of the close identification which both railroad company and city have to the entire project.

The cuts need no maintenance. There is a wall there as a part of

the original grade improvement; I can describe that a little better by saying that, on the southerly side of the improvement, just east of West Seventy-fourth street, we have a street known as Pear avenue, near Detroit street; we shortened up the area required for slopes and that means we must build a wall on the low side of the railroad cut.

Q. In the preparation of Exhibits 126 and 127 which I have not had an opportunity to examine or analyze in any way, you confined your investigation solely upon the increases made in the County [fol. 670] Auditor's office for taxation purposes at these three periods, 1910, 1917 and 1920?

A. Yes, sir; I made no examination of records of conveyances of land in the vicinity of this depression to see what was the actual effect upon land values. I did not consult a single property owner or former property owner as to the effect on land values in this whole stretch of territory. From general information I know land values in the City of Cleveland generally increased very greatly from 1910 to 1920 in common with other cities of the country. I think it is a fact that, in the City of Cleveland, there was a tendency generally to increase the assessed valuation of property.

No railroad runs through Edgewater Park; I testified the New York Central Railroad was the southerly boundary of Edgewater Park, for, I should say, 2,000 feet. I have a sketch that will show that. There are two crossings of the railroad by streets adjacent to Edgewater Park. The New York Central originally went through at the same grade they are going now, and, at the time of their construction, they built a bridge at Lake avenue, which is one of the entrances to Edgewater Park, and at time of construction of West boulevard, another entrance to Edgewater Park, they put up a stone arch; in both instances the railroad runs over the highway.

Q. The Nickel Plate, how many crossings are there of the streets by the railroad?

A. There are fourteen highways which are carried over the railroad.

Q. Adjacent to Edgewater Park?

A. Oh, no; you didn't say anything about Edgewater Park; it does not touch Edgewater Park. There is only one railroad that is [fol. 671] immediately adjacent to or touches Edgewater Park; it is the Lake Shore & Michigan Southern, and it crosses two streets; the railroad is over the street. East of Lake avenue the surrounding territory is at the same grade or possibly a foot or two lower than the Lake Shore tracks. Lake avenue was cut down in order to get it under the railroad, but we weren't talking about the territory east of Lake avenue, which is of a higher elevation than the Lake avenue territory itself; the ground to the east of Lake avenue is a little lower; I would say a foot or two than the roadbed of the New York Central, beyond Lake avenue the railroad is on an embankment up as far as Detroit avenue for about a distance of 2,400 feet.

The character of improvements adjacent to that on one side low-grade residences, that is, on the southerly side we have low grade;

then next adjacent on the north side we have low-grade residences up as far as the south line of Baltic road; beyond that the residences are high grade. As they depart from the railroad they increase in splendor, and, on the bank of the lake there, we have some magnificent homes as far as they can build; the residential possibilities there are about 1,000 feet.

Q. Is there only 1,000 feet along the Big Four or the New York Central or Lake Shore adjacent to Edgewater Park that is built up with high-class residences?

A. Yes; that is where it is adjacent to Edgewater Park.

Q. You have right in that vicinity some of the most attractive residences in the City of Cleveland, haven't you?

A. Beyond the boulevard, in that vicinity. If you can call 1,000 [fol 672] within the neighborhood or in the immediate neighborhood, yes. They have been built there since the railroad.

I confined my investigations as to land values at these three different periods to the tracts of land that are shown on the blue print map, and which are contained in these exhibits.

Q. You made no investigation then as to ascertaining what was the general increase in the assessed valuations of property in the City of Cleveland generally?

A. I knew from general knowledge of the tremendous increase downtown, that is, in our downtown district; I also knew of the tremendous jump which manufacturing property had taken and for that reason I think that a comparison of the total duplicate of the City of Cleveland would be unfair in this particular instance; of course, if we could take all the residential section or take all the territory which is similar to that affected by this investigation or by the Nickel Plate grade elimination improvement, that would be valuable and I tried to do that, but I did not succeed because there is no longer any individual ward totals kept by our auditor.

Q. I understand by that answer that you did not make any investigation as to the general increase of land values in Cleveland between these various periods, is that correct?

A. That is not correct; I have my tabulation for the entire City of Cleveland as it existed on each of the dates; there are annexations, of course which should correct our totals. I got these figures for the entire City of Cleveland from the Auditor's office. I don't know how these figures were arrived at; I got them personally from the Deputy Auditor of Cuyahoga County.

[fol. 673] Q. I understood that these tabulations you have furnished here, Exhibits 126 and 127, and in the blue print were made up from an examination of these individual tracts and the compilation of values put upon them?

A. You understand correctly, sir. I have no such compilation as that for the city at large.

I spoke about a contract price of 26 cents a yard for this Nickel Plate excavation that included some railroad service; they were given the right to run over the Nickel Plate right of way, the contractor was; he furnished all the equipment and he furnished the motive power. The contract was entered into in 1916; the work

was begun in the fall of 1916 and completed in August or September, 1917.

Q. We had some photographs at the former hearing when your predecessor, Mr. Richards, testified, which showed there were apparently some very good, substantial homes built on up to the embankments in places where the railroads were on elevations. You observed that, have you?

A. There are some fair homes of a little below the average along the Lake Shore Railroad just west of Lake avenue.

There are some houses which have the rear end of their houses abutting against the railroad right of way; those are the homes of a little below the average that I described previously.

Q. What is the value of these higher-class houses that you stated were in this immediate vicinity of this elevation?

A. When you say "immediately" I suppose you mean that 1,000-foot mark we spoke of; they are so big, brother, I am afraid I don't know; undoubtedly some of the highest class residences in Cleveland. These houses have been built since this road was running along that park as it is now.

[fol. 674] Q. You have some very attractive bridges in Cleveland where the railroads are carried over the streets, have you not?

A. That depends on the person's individual taste. They are not objectionable, but I never saw a plate girder bridge that was very attractive. With the exception of East Boulevard, I think they are all plate girders. It is feasible and practical to build a bridge without the plate girder exposed.

Q. Have you seen the bridge of the Wabash over Grand Drive in Forest Park in St. Louis?

A. I have not, that I recall. I visited the scene of this proposed track separation for about 30 minutes yesterday morning. I think I saw the entire project, that is, I started at the end nearest the park and then went out, winding around the various streets which cross the railroad and wound up at Delmar; that is the place we finished our visit. We went by automobile.

Q. The question of ground water was discussed in your direct examination; all this depression work that has been done on the Nickel Plate was above your lake water line?

A. Yes, sir. Our roadbed now varies from about 88 feet to 91 feet above mean lake level.

Q. Have you a profile showing whether this Nickel Plate depression is on a summit or in a pocket?

A. Yes; I have a profile with me.

Q. What was the grade of the Nickel Plate before this depression was adopted?

A. Lorain street was a high point from which the grade descended from the east at .32 per cent and to the west .29 per cent.

The grades I gave you were the grades of the railroad prior to grade elimination. Since that time the railroad has been put down in the depression.

[fol. 675] Q. It is practically a level grade through this elevation of the land adjacent, is that not true?

A. No; there is no elevation of the surrounding land at all; there has been a depression of the tracks. A cut has been constructed through this elevated land so the railroad goes through on practically grade.

Q. What is the grade which in Cleveland you seek to have as the maximum for railroads inside the city?

A. We are not near as interested in grades of the railroads as we are in grades of our streets, and we have not set any standard of our own on prohibitive railroad grades. If you will remember I said 11 of the grade eliminations had been accomplished by the street taking the entire depression; that in each case was due to the fact that the railroad was already on such a grade that we didn't care to impose any further burden on them; as an illustration, we can take the New York Central along this same Edgewater Park we spoke of. I haven't the exact figures, but the grade of the New York Central from the Union Depot west is somewhere between .7 and .8 and we didn't care to impose any further burden on them at that particular point by causing them to raise their grade. That blue print does not show any portion of the Nickel Plate track except that which goes through the depression; that is all depression from Detroit avenue, which is at the extreme left-hand end of the print to Fulton road which is about the right hand of the print.

At Detroit avenue, the street is carried over the railroad on a prior elimination job; there is a viaduct over Fulton road which isn't a grade elimination project at all; the surrounding ground there is considerably higher than the Nickel Plate railroad.

[fol. 676] Q. The railroad then goes under the street?

A. No, sir; the viaduct; that is because of natural conditions. In between Detroit avenue, and Fulton all the crossings are subgrade, the streets go over the railroad; all of them excepting those which are vacated at the railroad; we have a number of streets through there which are vacated through the railroad. There is no crossing there.

(Said Exhibits, City Exhibits 128 and 129, are marked.)

City Exhibit 128 is a map showing the street layout from Scranton road on the east to the westerly city limits on the west and Lake Erie on the north, and the territory about 1,000 to 1,500 feet south-erly from the Nickel Plate railroad on the south.

Q. About what is the distance from east to west as shown on the map?

A. 20,000 feet, and south from the lake it is approximately 7,000 feet. On this map I have along the N. Y. C. & St. L. which is the Nickel Plate, a number of street crossings marked in solid red; those indicate bridges, highway bridges over the railroad.

Q. That is along the line of the railroad indicated in the blue print marked "Exhibit 129," is that correct?

A. That is correct. Along the Lake Shore & Michigan Southern I have a number of street crossings marked with separated red lines; those indicate location of bridges which carry railroads over the streets and those with the "E" attached are bridges which were not constructed as grade-elimination projects, although I should correct

that—the bridge at Locke avenue and Lake Shore railroad was re-[fol. 677] newed as a grade elimination by the railroad company and not participated in by the city at all, and on all of these four structures the grade of the railroad has not changed from that which they originally came into the city on. I think I would remove the “E” from the place where the Lake Shore goes over Locke avenue.

Q. The separation of the grades of the Nickel Plate as shown on the maps marked “Exhibits 128 and 129” was because the topography of the country necessitated the method of separation?

A. It made that method advisable.

Q. You mean by that more practical and more economic and more desirable from all points of view?

A. Yes, sir.

Redirect examination by Mr. Senti:

Q. In this Exhibit 125 the plan of the Nickel Plate depression in Cleveland I wish you would indicate for the purpose of the record what is indicated by the different colors which that shows.

A. Those portions marked or tinted green are the old right of way land of the railroad; those with the red tinted land is that land which was acquired for a two-track system; the darker red is that portion which was acquired for a four-track system in addition to that required for a two-track system; that property tinted red and cross hatched yellow is that property the residue of which the railroad company retains and pays for as residue and the red tinted with red cross hatching is that property which the city retains as residual property and pays for. That which I last mentioned is farthest from the right of way as indicated in green.

[fol. 678] The sub-lot numbers, which identify each parcel number, are shown on the map.

Q. Just state from your memoranda here the manner in which it is determined what particular piece of property the particular set of figures refer to.

A. The first two figures of each parcel number indicate the street number near which the parcel is located; that is, we are dealing now with the figures inside of the circles on property which was acquired for grade elimination purposes, whether for four tracks or two tracks or street purposes; right of way previous to the grade elimination work shows in two enclosed brackets; land purchased for grade elimination purposes shows in the same way; land acquired through vacation of streets in connection with grade-crossing elimination work shows in two brackets.

Showing that to be an individual purchase, you see these four angles forming two channels in there. I am referring to West Seventy-seventh street and to parcels of land both within the right of way and adjacent to it.

This railroad has been operated through this cut since 1917.

Complaints by employees would not reach me. There has been no complaint of surrounding property owners of a greater density

of smoke now than there was previous to the establishment of that cut. There has been no complaint by surrounding property holders of a greater vibration by reason of that cut except of one man who wanted us to buy his property.

Mr. Hall:

Q. How do you know there have been no complaints about smoke and vibration? You mean you haven't heard of any except this one [fol. 679] man whom you think wanted to sell you his property?

A. They would naturally come to my attention if there were any complaints, going on that assumption, and none having been made me, I assume none had been made. One came to me, and I assume if more had been made, they would have come.

At this point an adjournment was taken until 1.30 p. m.

A. O. CUNNINGHAM, resumed on part of the Wabash R. R. Co.

Cross-examination by Mr. L. R. Bowen:

Mr. Hall: At the conclusion of the hearing in November, the railroad submitted some estimates of cost of construction according to the so-called Wabash plan and according to the City plan. Those were hastily gotten together and since then have been revised and changes made as to quantities and prices, making some changes in the total; we desire to substitute or supplement those estimates by those exhibits which I will have marked "Wabash Exhibits Nos. 47, 48, 49 and 50."

Mr. Senti: I would like the record to show that this is the first notice we have had of this; we have not been supplied with copies in advance and doubt whether we will be able to cross-examine upon figures submitted at this time.

Q. You began your testimony with a history of the negotiations [fol. 680] between the City and the Wabash Railroad Company, leading up to the present controversy; did you fortify your memory with the dates and facts with reference to that testimony?

A. No, sir.

I stated that when Mr. O'Reilly was president of the Board of Public Improvements Mr. Carl Gayler read a paper before the Engineers' Club, in which he advocated practically the same plan proposed by the Wabash Railroad Company today. The date on which that paper was read is March 1, 1905. It is possible Mr. O'Reilly was not president of the Board at that time; what I wanted to bring out was the fact that Mr. Gayler read the paper before the club. Mr. Phillips evidently was president of the Board at that time.

Q. You don't claim the fact that Mr. Gayler's plan as read in that paper before the Engineers' Club became in any way the official City plan, do you?

A. I said I didn't know, but since Mr. Gayler was a City official it might be assumed such was the case. Mr. Gayler was superseded that same year as bridge engineer of the City by Mr. Oliver W. Childs; he was engineer of the City, the exact time I am not sure.

Q. Mr. Hiram Phillips, who was president of the Board at that time, has been a strong advocate for the City's plan of depression of these tracks, has he not?

A. He has, since the City brought out this last scheme of yours.

Q. He was employed by the residents of Washington Heights and Parkview to assist the City in securing the adoption of that plan?

A. I don't know about that, but I do know he wanted to be employed by the Wabash to carry out that plan—this plan of the City's, the City's present plan, at that late date.

[fol. 681] I stated about the time Mr. Reber became president of the Board of Public Improvements Mr. Pitzman undertook the development of some property north of Lindell and proposed a grade separation which would be a depression between Union and De Baliviere, and shortly after that the City prepared a plan showing such a grade separation.

I referred all the time to the depression scheme as the City's plan. Mr. Pitzman is an engineer in St. Louis, not at all connected in any way with the City government that I know of. He is a member of the American Society of Engineers, and, as such, is considered as an engineer.

I do not recall that the plan advanced by Mr. Pitzman received a good deal of attention in the newspapers. I believe I do now remember that at about that time the papers had pictures of Mr. Pitzman's idea of Forest Park with the tracks running through it.

Q. Wasn't the outstanding feature of Mr. Pitzman's plan a scheme for moving the Wabash Railroad Company south of its present alignment in Forest Park so that it would run on a line 250 feet south, and parallel to the boulevard?

A. We had one such plan as that, I believe. I don't know whether it was that particular plan that received the attention of the newspapers; we had one plan. That is not the plan I referred to as Mr. Pitman's scheme; it was only referred to as a depression scheme; to show the difference between a depression and an elevation. I don't know whether that was advanced prior or subsequent to the time of the scheme to move the tracks in Forest Park.

[fol. 682] I have seen no plan of Mr. Pitzman's except possibly the one referred to by you as shown in the newspapers, and the only plan I refer to as Mr. Pitzman's is the depression plan, irrespective as to what it was or how it was done.

Q. The plan proposed by Mr. Pitzman for moving the railroad tracks in Forest Park provided for carrying the tracks over Union boulevard overhead and depressing them under De Baliviere?

A. One of his plans might have proposed that. I don't know the year Mr. Pitzman's plan came out. I don't know that a reference to newspaper files would convince me of the date. I talked

with him often about that scheme and it was in my mind because he was particularly interested in getting the depressed scheme on account of the properties he was laying out. That is the reason I remember it so well; the exact date I don't know because I haven't looked up any of the dates.

Q. We would like to bring out the date of that. We have the file of the Post-Dispatch of the year 1906; I refer you to issue of January 25th, in which a discussion of Mr. Pitzman's plan is had. That is the plan you referred to?

A. I don't know whether it is or not; I know he had a plan similar to that at one time, but as to whether that is the plan he talked to me about, I don't know.

Q. The plan advanced by Mr. Reber was, as far as the railroad is concerned, substantially the same plan as the City has presented in this case, was it not?

A. No; it was a little different. I am not talking about the profile; that last plan or profile is substantially correct. I am not quite clear as to the profile in respect to the change through the park; [fol. 683] that might have been changed after Mr. Reber left office; I am not sure.

The plan advanced by Mr. Reber was substantially the same as the one advanced by Mr. Pitzman, because it was a depression scheme.

Q. You don't know whether Mr. Pitzman's plan advanced track elevation at Union boulevard, do you?

A. It might have, because, at that time, the grade would have been too great to get down under Union avenue, that possibly he was wise enough to see it couldn't be done.

Q. Do you call the plan proposed by Mr. Pitzman, which advocated moving the railroad 250 feet south of its present location and carrying it over Union and under De Baliviere, as a plan similar to that advanced by Mr. Reber which proposed to depress the railroad in its original location?

A. Somewhat similar except it is depressed in certain proportions. The plan advanced by Mr. Pitzman in 1906 might have been proposed more than three years before Mr. Reber became president of the Board of Public Improvements; maybe it was six years before the plan was proposed by the company.

I intended to convey the idea that Mr. Pitzman was the first man to suggest the depression of the tracks in that vicinity and after that along came the City with a similar depression scheme; whether it was exactly the same, or whether it depressed at the same places, made no material difference to me, except I meant it was a plan similar in that both were depression schemes.

Q. You have no idea in connecting up the City's plan with any real estate scheme, did you?

A. I always had that idea; yes, sir.

[fol. 684] Q. Isn't it a fact that, in the year 1912, Mr. Delano, president of your company, and one of the receivers Mr. Bixby, and Mr. Pryor, another receiver, agreed that the Wabash Railway Company would depress its tracks substantially as shown on the City's profile today?

A. If they had agreed to it, it would have been done, but they didn't agreed to it.

Q. At a meeting on January 31, 1912, in the board room of the Board of Public Improvements, at which time was present the Mayor of the City of St. Louis, the Comptroller, the Committees on Railroads of the House of Delegates and Council, the President and members of the Board of Public Service; if Mr. Delano, president of your company, and Mr. Bixby of your company didn't state to all of the gentlemen present that the Wabash Railroad Company would separate its grade crossings between Kingshighway in the City limits, pay all cost of construction, if the City would assume the consequential damages?

Objected to for the reason that the receivers were appointed by the Federal Court and could not bind or obligate in any way this present corporation to take any action with reference to separation of grade crossings in the City of St. Louis; the present corporation was not in existence at that time, and nothing was said by any former officer or any receiver that would be binding in any way. Objection overruled.

A. I wasn't at that meeting; I don't know whether it is a fact or not; they might have said that.

Q. At a meeting in the room of the Board of Public Improvement [fol. 685] held on March 7, 1912, at which you were present, did not the president of the Wabash Railroad Company, Mr. Delano, and Mr. Bixby, one of the receivers, tell the members of the Board of Public Improvements that if the City would agree to an elevation of 49 for the grade of the Wabash track at Lindell boulevard, that they would accept the City's plan of depressing the tracks?

A. I don't remember being at the meeting.

Q. If those facts were brought out by the minutes of those meetings, would it be your statement that the Wabash Railroad Company has consistently opposed the depression plan to be strictly true?

Objected to as being argumentative.

A. I will say the engineering department had consistently objected to going down below the water; under your scheme that is it; what attitude the Receivers took, that is Mr. Pryor chiefly, who is more interested in our going up, and Mr. Bixby, who was a citizen of St. Louis, and Mr. Delano, who really was not much interested, they may have agreed to most anything, I don't know, but at that time I wasn't consulted very much. Mr. Delano was president of the Wabash from 1905 until the receivership and he was a receiver during the period of receivership. I believe he pretended to be an engineer.

Q. I believe you stated in reconstructing the bridge that carried the Wabash Railroad over Grand drive in Forest Park, that you encountered a tremendous amount of water in building present bridge;

how deep did you go with your excavations at the time you encountered that water?

A. We went down to the foundation of the old bridge that was there. The water bubbled up. There was a bridge over Grand [fol. 686] Drive before we constructed the new bridge. This photograph is a correct representation of that old bridge. I believe that bridge was built by the Commissioners of Forest Park in 1876, I am not sure.

(City's Exhibit No. 130 marked.)

Q. Why was the old bridge torn down and reconstructed?

A. A greater opening was required; the old span of the old bridge was 40 feet, I believe; the new is something like 70 feet. I stated I built the new bridge on the foundations of the old bridge.

Q. How did you do that with that difference in span?

A. Because there was the wall abutment and the wall ran back a long distance past the front of the abutment.

Q. You mean to say that the abutment of the old bridge was wide enough to support the abutment of the new bridge with the difference in span?

A. There was the foundation extending that much farther back in the old construction, possibly you would like to know that very often we build along the wall that way. I don't remember exactly the width of the wall; I presume it must have been about 30 feet wide.

Q. You mean all this was solid masonry as shown in the approach here?

A. The foundation was. I couldn't say whether Mr. Carl Gayler was a resident engineer on the original bridge when it was built.

Q. You have spoken highly of Mr. Gayler's ability as an engineer; how do you value his integrity as a gentleman?

A. I am not going into his integrity, because I know he is a gentleman.

Q. If Mr. Carl Gayler states that when he built the first bridge [fol. 687] he encountered no water of any kind, but set the masonry stones on the dry, hard clay earth, you would accept that as a fact, would you not?

A. Certainly, if he states so.

Q. Does the presence of water at that point have any effect on the City's plan?

A. It goes to show there is a lot of water below the surface of the ground. I believe the City's plan is about or near the same elevation as the grade of the street at that point. It may be a little higher.

Q. The total depth which the City proposed to place the tracks at any point is only about five feet lower than the grade at Grand Drive, *it is not*?

A. I don't think so; I don't know but the profile would show that; you can see it on the profile. We did not drive any piles to support the new Grand Drive Bridge.

I spoke of the street car crossing built in 1903 just east of De Baliviere; I was speaking of the undercrossing built by the Suburban Railway Co. That drawing looks as if it might indicate the right of way occupied by the street railway at that time.

Q. The actual crossing of the street railway company's tracks under your tracks was at a point about 550 feet west of Union boulevard, was it not?

A. West or south on Union, yes.

Q. It was built in an old draw where you formerly had a 10-foot culvert extending under the track and where the former culvert under the Catlin tract drained into the River des Peres?

A. I don't know. I don't believe the street car tracks at that location were constructed some three feet lower than the City proposed to depress the tracks at that time. I couldn't tell you if [fol. 688] that track was drained directly by the culvert under the Catlin tract to the River des Peres.

Q. Can you state on your own knowledge that that water in that street car subway ever actually prevented the operation of street cars through it?

A. As I remember personally, it did prevent the proper passing of cars at many times.

I think the pedestrian subway at De Baliviere was built and maintained by our company; I am not sure about that. My understanding is there was a 12-inch drain built in that. I had nothing to do with it. I said the street car crossing was drained by pumps, not the De Baliviere crossing. As I remember, that crossing at De Baliviere was flooded several times; one time it was a freshet that caused it and other times there was water in it quite often.

Q. You stated that at one time of your negotiation with Mr. Reber, a pit was built near Union boulevard. Do you happen to know which department sunk the pit?

A. I don't know whether it was Mr. Reber or who. I suppose one was sunk; I never saw it. I don't know whether the negotiations with Mr. Reber were in 1912.

Q. The other pits you mentioned were sunk, two in the fall of 1916 and one in the fall of 1917?

A. I don't know and don't remember as to the date. It might have several years after the expiration of Mr. Reber's office and it might not.

Q. An exact and daily record of their digging and the height of seepage water was kept by the City and has been filed as a matter of record in this case, has it not?

A. We got a record; I don't think we filed ours. I don't remember [fol. 689] stating how deep the water was anywhere except in general terms. I stated my assistant kept a careful record of the water in the test pits. I think I advised you previous to the hearing that I had kept such a record. I haven't looked at your record at all.

Q. Was it only a small amount of seepage water encountered in digging the holes?

A. I don't agree with you there; I went down in one of those

places myself and say the water coming in, I also saw the material sloughing off in one of those holes. The hole which I visited was for some little distance; cinders, and then material looked to me like sand.

Q. Is there any serious engineering difficulty in adequately taking care of such an amount of seepage water?

A. That is a problem to find out after we start the work at that particular point. My judgment is that we would be very foolish to go down into that wet, sloppy ground when we could keep up in the air and be out of it entirely.

Q. Do you think there would be any serious engineering difficulty in adequately taking care of that amount of seepage water?

A. I say we are going to have a great difficulty with water if we go down. I believe we would have to go to a great deal of expense, more than you think, if we go down.

When you drain all the water to a central point in a pocket, you are going to have trouble anywhere you are, any location in the country and when you come to blast there it is saturated with water; if you tried to remedy that by artificial drains you are going to expend a lot of money in maintaining that roadbed.

Q. Is there no such thing as providing proper drains to adequately take care of that amount of water?

[fol. 690] A. There is a way of overcoming it, not properly, but the best way possible, yes; there is a way of putting in drains. That does not entirely solve the problem.

Q. Does the City's plan show such adequate drains through there?

A. It shows enough drains to take the surface water away from the roadbed, but it does not and cannot prevent a wet roadbed. If you have the proper natural drainage, then you will have the least amount of trouble, but when you put in an artificial drain, you will have the maximum trouble with your drainage and a wet roadbed.

Q. Whether the drainage is artificial or natural, it does the same work?

A. Not at all. First the water can take care of itself without any artificial means, and if you have a proper place, such as a high promontory, you can drain the water both ways away from your cut, you will naturally get really fair drainage, but when you make a pit for yourself and try to drain that pit, then you are running into trouble.

Q. Throughout the whole State of Missouri your railroad company runs through a succession of cuts, does it not?

A. Very many of them, but not like this one; nobody would ever attempt to build a railroad in a cut like this; there are cuts in places where the drainage takes the water off in either both or one way.

Q. Railways have been built in all sorts of wet locations, have they not?

A. Not in locations like you propose.

Q. Your principal objections may be based on four items—drainage, clearance, grades and cost?

[fol. 691] A. Yes, that is the whole thing. I will leave the item of

pilfering to the police department of the railroad and somebody who knows something about that can testify.

I am not familiar enough with the subject to advise whether the depression of tracks as suggested in City's plan would increase trespassing. I think it would increase vibration because the sound would naturally travel to the walls and be reverberated against the other walls; echo; that would be a reason why there might be more vibration.

Q. I believe it was testified in this case that vibration of the trains would shake down the buildings, do you believe that is a serious thing to consider?

A. Nobody ever testified to that while I was here. I do believe the depression would cause smoke from the train to obscure the vision of signals. Whether the smoke runs behind trains depends upon the way the wind is blowing and how fast the train is going.

Q. With reference to the drainage, your objections are based on the seepage water and storm water?

A. The seepage and storm and possibly artesian water.

Q. With reference to storm water, you are willing to abide by the report and advice of the expert you have employed and who testified previously?

A. I don't know; maybe I would and maybe I wouldn't; it would depend upon after we got down there and found out whether this calculation is correct or not. We employed the finest engineers we could think of and they guessed the best they could; that is the only way you can do with such problems.

I said in a new construction in building new bridges over a track a viaduct should not be built over a railroad track in this day and [fol. 692] age with a clearance of 18 feet—get the exact wording out of the testimony; you read what I said.

Q. The question put was—"Should, in your judgment, any structure of that kind be put over a railroad track in this day and age with that clearance?" referring to a clearance of 18 feet, and your answer was "No, sir, not unless it otherwise can't be done."

A. Yes, sir; that is it.

Q. The clearance of the bridge at Kingshighway where the City plan proposes that the change in grade shall begin is something less than 18 feet, is it not?

A. Yes, sir.

Q. The bridge just east of that point at Euclid avenue has a maximum clearance of over 17 feet; and in other direction the bridge at St. Charles rock road has a clearance of 18 feet 3 inches?

A. More than that. Your foundation of that bridge is put down to a depth that you can get a good clearance there because we expect some time to do some lowering there and I want to advise in that respect that you couldn't go any higher with the roadway; in fact there is quite a crown on that now and we went down to the lowest point that we could carry the railroad at its present grade and it is proposed to reduce the grade of the railroad at that point. It is absolutely feasible to depress the railroad, put a little dip in it there.

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Q. Examine City's Exhibit 39, showing profile of the Wabash tracks extending westerly from Etzel and state just what the effect would be of depressing your tracks?

A. It would put in a very short steeper grade on the west and a less grade on the east to meet present grades.

[fol. 693] Q. It would make the grade towards the west in excess of one per cent, would it not?

A. But you have west a less grade before you get there. I have said it would.

Q. It is necessary for men to ride on top of freight cars within the district in which the City's plan proposed bridges over the railroad tracks?

A. I believe the operating rules require them to do that; not being an operating man I am not in a place to state that that is a fact. There are no industries between Delmar and Kingshighway. I think there isn't much opportunity of an industry ever locating in that district.

Q. And all of the overhead bridges proposed by the City's plan lie between those points, do they not?

A. Between Delmar and Kingshighway; that is right. I do not personally know of any grade separation work outside of St. Louis where tracks have been depressed where more than 18-foot clearance was provided; there may be some possibly going up in some districts; as was shown here; there was one in Cleveland, the Nickel Plate, but it is something that shouldn't be done anyway, if it is possible to get out of it, even at a good deal of expense.

Q. On page 522 of the record you were quoted as saying, "City proposes to introduce a 10 per cent grade from the foot of De Baliviere avenue to an elevation over Page avenue, a distance of at least two miles"; you mean eight-tenths of one per cent grade, did you not?

A. I didn't say that; I guess the stenographer put that in.

Q. Examine City's profile, Exhibit 83, the eight-tenths of one per cent grade begins at Waterman avenue, and not at De Baliviere?

A. The profile indicates where it extends from and where it extends to. [fol. 694] tends to. As I remember, there is an eight-tenths grade, changing to a six-tenths grade running north. I should say starting a little west of De Baliviere; it is practically nine-tenths between De Baliviere and Waterman and then it shows an eight-tenths per cent grade running to Maple avenue and sixty-four-one hundredths per cent grade to Page avenue, and it is practically an all up-grade climb from De Baliviere to Page avenue. Between those two points, anyway, the actual extent of the eight-tenths per cent grade is only nine-tenths of a mile.

Q. The grade shown on the City's plan extending over Page avenue is less than your existing grade at that line, is it not?

A. It may be.

Q. On page 525 of the record you are quoted as stating you have "a very short grade, about 2,000 feet, near the foot of Lindell avenue, climbing to the Grand Drive," and that the "City's plan proposes to introduce a grade of the same amount or more,

leading from Lindell avenue to Kingshighway," which is a distance of about 4,000 feet?

A. Whatever the distance is.

Q. The present grade of your track rising up to the bridge over Grand Drive is in excess of one per cent, is it not?

A. You have a run for that grade and it is only a short grade with the grade you propose to introduce. I am not sure whether it is in excess of one per cent; it may be that or it may be more.

Q. It is also a fact that the maximum grade on the City's profile between Lindell and Kingshighway is eight-tenths of one per cent and that the length of the track with this grade is 400 feet, and not 4,000 feet, is it not, as you have testified?

[fol. 695] A. If you wanted to have it exactly or minutely described, I said an eight-tenths per cent grade for a certain distance, and it is an uphill climb for a long distance. I don't know whether you think there is quite a difference between 400 and 4,000 feet; I do. I don't know whether the total length of the eight-tenths per cent grade shown on the City plan was less than one mile all put together. I believe I said with reference to Mr. Hayes' testimony as to the economic effect of the changes in grade of the tracks as proposed by the City's plan I could see at once he was either trying to misrepresent the subject or didn't know what he was talking about. I did not say he was either a "knave or a fool." I dismiss Mr. Hayes' testimony with the statement that he started on the wrong premise. Mr. Hayes' testimony based on the premise that a train running down hill gathers momentum was quite correct so far. A train running westerly from Kingshighway on the grade the City suggested would gather momentum.

Q. It would hold a large part of the momentum running across the level stretch between Union and De Baliviere, would it not?

A. That is where you are getting wrong; if you would continue without stopping, you would be all right, but you have to stop at De Baliviere because there is where you decrease your speed because there is an interlocking tower there connecting between the Rock Island and ourselves. If you stop you would have to be under control; you can't go 45 miles an hour there with a train. The Rock Island stops there every day. I don't believe our trains do. We [fol. 696] might be required to stop there at any time, then your figure is all wrong. The Rock Island train at present is using the Wabash tracks; using the two-way Wabash tracks at those points. As I remember, we have two main-line tracks and a passing siding there.

I believe the Rock Island entered into an agreement with the Wabash where they were to use the eastbound Wabash track as their main line; formerly they crossed the Wabash and used the track on the north side and that was changed. I believe another track was introduced on the east of the two main Wabash tracks, which I think, is used as a passing siding; it was at one time.

Q. Nothing but a westbound Rock Island train can interfere with a westbound Wabash train between Union and De Baliviere, then, notwithstanding the fact that they have an interlocking plant at De Baliviere, there would be no occasion for stopping unless the

train before the train we are considering was too close, would there?

A. In the operation of trains it is necessary for trains to stop between De Baliviere and Union or the other side, because the trains are operated by block signals; the engineers never know when they are coming against the block; they have to stop and the interlocking system makes it necessary and they have to be under control there.

Q. If a train was in this block between Union and De Baliviere, the engineer would get his signal before he started down the grade, would he not?

A. He might be on the grade; the frequency of the occurrence of such blocks is very great. I don't know whether the Rock Island runs only two trains in one direction a day.

[fol. 697] Q. There is an agreement with your company which provides that they must not run them closer than eight minutes to your train time, is there not?

A. We have a block signal in through there that takes care of that. Our company controls the operation of trains through that district. Our company might arrange the time tables of the two companies so they would not ordinarily interfere for today, but tomorrow it might not be convenient or for the next year; we are looking for the future. How do you know what is going to happen in the future? Maybe a suburban railroad company will build a track through there, with any number of trains coming through there.

Q. It is a fact that nothing could block your westbound train but a Rock Island train, isn't it?

A. Another train; yes. Or the interlocking tower might stop the train. I wouldn't say it is with great infrequency that a train is stopped by the interlocking tower at this point. I would say it is not infrequent. I am not sure that at present 15 out of 21 trains that pass through there a day are passenger trains.

Q. Only passenger trains operate on the Rock Island through this district?

A. They must have some cuts of freight cars going to the yards to the other side of Vandeventer. Their time table wouldn't show the switching movement. I consider the grade the City proposes is absurd for new construction work. The steepest rate of grade on the City's profile is eight-tenths of one per cent. There are other grades less than eight-tenths and the six-tenths considered a great deal farther; it starts at eight-tenths and keeps on going up until you get to six and seven-tenths.

[fol. 698] Q. Examine City Exhibit 39 and tell the Commission whether in that entire distance of 10½ miles extending from Grand avenue to Ferguson you have more track with a grade less than eight-tenths per cent than you have with a grade in excess of eight-tenths per cent?

A. I am not disputing on that point at all; when we build something new we try to overcome those grades. Everybody knows we have grades all along here in excess of those the City proposes. I don't know that for more than three miles of that distance they run

continuously on a grade of one per cent or more. From that profile, it is the way it goes. Suppose they do climb a hill more than 110 feet high. I don't know that this profile is correct, or not; I am assuming it is.

Q. In part of that distance the tracks now run in a cut more than 50 feet deep, do they not?

A. Yes; they run through a cut; I don't know whether it is 50 feet or not, it seems very high to me. Is isn't a velocity grade; it is what is known as a ruling grade over this stretch of track; it fixes absolutely the load that a given engine can haul over this stretch of line. Alderney station is just a shed. It is only a local stop there.

Q. Near station 170 on the profile is indicated a stop, Glen Echo; is that on a one per cent grade?

A. It is on that grade there. Near station 140 a station, St. Vincent's; that is only a shed; there is no local stop there; passenger trains go over that and don't stop.

Q. The grade over the approach to the Merchants Bridge, on which your Delmar-Chicago trains run, is two per cent, is it not?

A. I don't think so.

"City's Exhibit 131," marked.

[fol. 699] Q. I hand you City's Exhibit 131, which shows the profile of the north approach to the Merchants Bridge running eastwardly from East Grand avenue and ask if, on that profile, a grade is shown as steep as two per cent?

Objected to by Mr. Hall because the profile itself shows what it shows and the Commission is as able to read it as Mr. Cunningham.

Commissioner Bean: He may answer.

A. The profile handed me says, "Profile, St. Louis Terminal Railway north belt between switch point 'Y' on Merchants Bridge and Gano avenue, City of St. Louis, Office of Engineer, Bridges and Building." Shows a very irregular one, at one place for a short distance of two per cent and another stretch of one and one-half per cent; one stretch 1.44 per cent and another two-tenths of one per cent and another stretch 1.7 per cent and another stretch two-tenths of one per cent. Our Chicago passenger trains that pass Delmar run over that stretch of track, and I will add that they sometimes have to be pushed up. Just before the trains start up that grade they must stop because of an unprotected railroad crossing. The grade of both approaches are either $1\frac{1}{2}$ or $1\frac{1}{4}$; I think they consider it $1\frac{1}{4}$ per cent on the regular approaches to the Eads bridge.

The grade of the western approach to our bridge at St. Charles is one per cent; it is quite a curve on the bridge and approaches. I don't know whether the trains that bring freight from points originating on our line between Grand avenue and City limits run beyond Ferguson as through trains.

[fol. 700] Q. If they did not, but simply run to Ferguson and

there are made up in trains to be sent long distances westward, the grades on your line between Ferguson and Grand avenue could not seriously affect the size of the train, could they?

A. The ruling grade, as we all know, is about one per cent and it is customary to take a run for it. Every passenger train that stops at Delmar stops also at Vandeventer avenue. I think they do; I am not sure; maybe I am mistaken.

Q. The conditions at Delmar will be no worse than at Vandeventer avenue, if the City's plan is carried out?

A. Not at the present time.

Q. The use of such grades at railroad stations is not uncommon practice, is it?

A. When you can't help it, then you have to have a grade there; it is an objection, but you have to have it if you can't get out of it. There are occurrences.

Q. One of the finest railroad stations in the United States is the Union Station at Washington, D. C., is it not?

A. It compares with any of them; yes.

Q. The tracks enter that station at two levels, do they not?

A. I can only remember one; I don't remember; maybe they have changed it since I was there last.

I don't know anything about the grades there. I am not familiar with the Vandeventer avenue station of the Missouri Pacific Railroad Company. I am not familiar with the plans that were before this Commission for the Oak Hill grade separation at Tower Grove.

Q. In your plan for elevating your tracks over Hamilton and Delmar avenues, with runoffs from Olive Street road to De Baliviere, [fol. 701] what grade do you propose for the runoffs?

A. Temporarily, one per cent. There would be a hump at the Delmar station. The station is immediately north of Delmar avenue.

Q. If you have a one per cent grade between Delmar and Olive Street road, it will be necessary for the eastbound trains to start on a one per cent grade, will it not, if they stopped at the station?

A. No; the engine might be over the grade. If the engine was over the grade, the balance would be on the grade.

With reference to the embankment required for raising Delmar boulevard, I stated after the pavements were laid, the side slope would naturally erode, through action of the elements, and the embankment under the sidewalk would wash out and the sidewalks would naturally fall down; I also stated all embankments would so erode; that would include the railroad embankment and the steeper the embankment, the more rapidly will be the erosion.

I have suggested a high embankment of about three miles long; the side slopes on that embankment are shown on my plans to be one and one-half to one, except in the park and along the north side of the section east of De Baliviere; that may be steeper than the side slopes provided by the City's plan for Delmar boulevard.

Q. In all grade separation work, of which you know, hasn't the municipality been charged with the maintenance of the street pavement; any cost of maintaining the side slopes along Delmar until the property is built up would be something for the City of St. Louis to take care of?

A. Yes. I don't know who built the Union avenue viaduct; I don't know that it was designed by Mr. Bowen, our witness. I don't know that Fruin-Colnon built it. The street railway tracks on it [fol. 702] were completely separated from the roadway.

Q. A temporary pavement of macadam was built over it and was allowed to stand a number of years before the hard paving was laid?

A. I don't know whether it was or not.

Q. You have testified that, as regards the settlement of the fill, it has been a total failure, did you not?

A. I didn't say a total failure. I testified that the fill settled a very great amount.

Q. You recommend that same method of construction for Delmar avenue, do you not?

A. I didn't recommend anything; my recommendation is that you don't build it. I think I said that if a viaduct was built at Delmar avenue it should have a temporary pavement and be allowed to settle a number of years before the pavement was laid. I also testified that the fill at Union boulevard had settled in full.

Q. As a matter of fact, isn't water a most potent factor in causing an earth fill to settle?

A. Yes; it is the most important—potent if you want to call it that.

Q. Wouldn't you suppose in view of the importance of getting the City streets back into service and getting it improved with a permanent paving, that the various City engineers would have found means to settle the fill without building a temporary road and waiting four or five years for the action of the elements?

A. They haven't seemed to have done it yet.

Q. Are you familiar with the Twelfth street viaduct?

A. I have been over it, but I haven't noticed it much. I couldn't say it was built about the same time as the Union avenue viaduct.

Q. Are you familiar with the Chouteau avenue viaduct in St. Louis?

[fol. 703] A. I know of it; that is all. I couldn't tell whether its pavement was laid in fresh fill or not. I don't know that it carries a number of street car lines.

Q. Refer to Wabash Exhibit No. 43, which is intended to show the appearance of the Delmar avenue viaduct after the grates are separated. The buildings shown in that picture are valuable buildings, are they not?

A. I wouldn't say whether they are valuable or not; I did not testify as to their value. I know some of the buildings. I do not know if they are valuable. I have passed by there a number of times. From the exterior I would say they are a very good grade of stores. It is up to the owner of the buildings whether they would be allowed to stand in the position shown in that photograph after the grade separation.

Q. The three-mile long embankment, in accordance with your plan, would settle, would it not?

A. It would settle depending on the material that was used in the embankment.

Q. Would the settlement be likely to result in a derailment of your company's train?

A. It would not.

Q. Would the same settlement occur if the tracks were depressed?

A. No; the ground in depressed tracks would be wet and sloppy and the track would be depressed and get very uneven in a very short time.

Q. You stated if the alignment of your tracks in Forest Park were changed as the City's plan proposes, you wouldn't have as good a railroad as at present, did you not?

A. I don't know whether I stated that fact or not; it wouldn't be bettered any, that I can see.

[fol. 704] Q. If three miles of your track were placed on a fresh embankment of an average 20 foot in height, would that railroad then be as good as your present railroad?

A. Not until it settled. It would take years to season. If we raised the section between Olive Street road and De Baliviere avenue, and some years later raised the remainder of section under discussion, it would not have to settle twice. You would put part of your fill down first and another part down later. We would run our tracks on each of those fills. Both fills would settle. They would settle and keep on settling while the other was put on, they would both settle.

Q. I am talking of your proposal to separate the grade crossings at Delmar and Hamilton by raising the track and building runoffs from the raised track; in a proposition consisting of runoffs, you would have your track placed on a fill at one time and then later after the rest of the grade crossing was carried out, you would have to have it placed on higher fill would you not?

A. Part of it; yes. It would have to settle. When it was placed on the second fill, the second part would settle; it does not make two settlements.

Q. Your objections as to cost are based on the assumption that the execution of the City's plan would cost very much more than the elevation of tracks?

A. Yes; that is my belief.

Q. You have testified that you have complete plans for the elevated scheme; are those complete plans comprised in the profile you have submitted, these six prints of bridge drawings, your Exhibit 34, which shows seven cross sections of track?

A. They are complete enough on which to make an estimate; they [fol. 705] are not detailed plans, and neither have you shown in the City plan a detailed plan.

I don't believe we change the grade of our tracks between Grand Drive in Forest Park and Kingshighway.

Q. For nearly half of that distance it runs on the present level of ground, does it not?

A. There are some places a cut and some places a fill.

Q. But for nearly half the distance it is neither in a cut or a fill, but on the level ground, is it not?

A. There is some slight fill, as I remember now. One side of the bank is higher than the other.

Q. It is on the grade of the slope of the park?

A. It is on the original ground. It is built on the side of a hill and the cut was made so as to make a level place for the railroad to go and that is practically the solid ground, if that is what you mean.

Q. That section of your track is crossed by a well-traveled pedestrian entrance extending from Forest Park boulevard at Kingshighway, is it not?

A. The only place of entrance I know of near there is a foot passageway under the tracks, between the drive and Kingshighway bridge. I don't recall the grade crossing of the pedestrian path from Forest Park over our track in that section.

Q. The present height of your tracks in that section between Grand Drive and Kingshighway is too high to permit Forest Park boulevard being brought into the park without causing a grade crossing with your tracks, is it not?

A. You mean at present? Our tracks are high enough to permit a grade separation at that point, if that is what you mean. I don't know anything about Forest Park boulevard; it is quite a long distance away.

[fol. 706] Q. At Lindell you propose to throw up a railroad embankment more than 18 feet high, do you not?

A. There will be an embankment similar to the one you are going to put there.

Q. With the side slopes which are shown on the plan as being two to one, the width of that embankment will be about 108 feet wide, will it not? The whole width of your embankment?

A. Maybe it will. The width of our right of way in Forest Park is 70 feet. I know it is 70 feet.

Q. Referring to your bridge plan, Exhibit 35, you show proposed bridge to be constructed immediately adjacent to the south line of Park road, do you not?

A. If it shows it that way on the plan that is the way it is intended to be constructed.

Q. By reference to City's Exhibit 38 you will note that if the grade is placed in that location, it will be necessary to change the line of your right of way in Forest Park, will it not?

A. I don't know.

Q. Can't you tell by referring to this plan?

A. We can accomplish that somehow without changing our tracks, either by retaining walls or something else. I think our right of way is 70 feet and they have shown it (referring to City's Exhibit No. 38) only 42 feet, and my remembrance is that it is 70 feet wide, is the right of way; if not, we will have to build retaining walls, that is all.

Q. On your plan you only show one cross section for the entire distance from Grand Drive to Lindell boulevard, do you not?

A. We just show one cross section.

Q. Could anyone possibly make an intelligent estimate of a proper fill with only that single cross section in a distance of 2,000 feet?

A. Yes.

[fol. 707] Q. The grades of your tracks between Grand Drive and Lindell boulevard with reference to present grade in the park are constantly changing, are they not?

A. They may be picking up a track occasionally, something like that. Our tracks rise from Grand at Lindell boulevard to pass over Grand Drive bridge on an embankment.

Q. You propose to place a new embankment that will fill over the old embankment and extend it to practically uniform grade between Grand Drive and Lindell boulevard?

A. Yes; that is right. You must understand we haven't gone to the trouble of making a cross section every 100 feet, but we have those notes so that a proper estimate has been made; this plan is for our own information more than anything else.

Nobody could make an intelligent estimate from the plan submitted to the Commission unless they knew the profile of the ground.

Q. On the City's plan, however, the cross sections are shown for every 100 feet, are they not?

A. They may be; I don't know; of course the city has more people and more money to spend; it is a trivial matter to me. Referring to my bridge sketch for Lindell and Union, there is not a dimension shown on that save only the width of the ribs between the tracks.

Q. Could any engineer make an intelligent estimate of the cost of that bridge from that plan?

A. A man could come pretty close to figuring what it is going to cost from this plan.

Q. You do show one thing; that is the clearance between the center line of the track to the bridge rib; that is shown as 7 feet; is that good railroad engineering?

A. It is 14 feet in the clear. You should have a wider clearance if [fol. 708] you can possibly get it, this is only a preliminary plan and undoubtedly it would be changed when it came to be built; a preliminary plan does not have to be adhered to exactly, and when it would be constructed, in all probability the estimates between the trusses or between the clearances of the trusses would be changed, which wouldn't have any effect on the city at all; it would be changed undoubtedly to suit the railroad.

Q. The only judgment that can be made of plans submitted to the Commission must be based on plans as submitted?

A. Not necessarily when everybody understands that these are tentative plans simply. I say your plans are only tentatively plans, only a little bit more elaborate than ours.

Exhibit No. 28 indicates in a general way what a bridge like that would look like as close as any architect could draw such plans. It is supposed to have been drawn by an architect from this blue print here to show the exact construction of the streets and why it could not be built close enough to show why the bridge would look like this, I don't see any reason for criticism.

Q. The north line of this triangular strip of land lying between

Lindell and Park road is shown on the plan to be about twice the width of Union boulevard along that line, is it not?

A. I don't know.

Q. I am talking about your Exhibit 35, I ask if it is not a fact that this north line of the triangular strip which lies between Park road, Lindell and Union boulevard isn't shown by your plan to be nearly twice the width of Union boulevard along that same line?

A. It may be; it looks to me to be longer; that is right. The [fol. 709] sketch does not indicate that that triangle is as large as this triangle; that is true; it also indicates to me as if Union boulevard was much wider than it is on the ground.

Q. What we wanted to bring out this, the fact that standing south of this proposed bridge, it would be impossible to see the property north of the bridge along Park road and the picture shows that property quite visible from the park side.

A. It is not my intention, if it is ever built, to in all probability, make this a single pier instead of this long abutment and that does not change the general scheme of the separation of grades at that point; in other words, this plan can be made to conform to that plan. I mean the blue print is not intended to conform to the sketch.

Q. If the bridge is built in accordance with your plan then east-bound traffic on Lindell and eastbound traffic on Park road would not come within the vision of each other until they were within about 50 feet of each other, is that not a fact?

A. I don't know; it would be simply no more than if a building was here on the corner; just because you have a building on the corner, must we wipe it out because you can't see diagonally across to the other side?

There is a great deal of automobile traffic along Lindell.

Q. There is no street that crosses Lindell between Union and Kingshighway east of that point, is there?

A. Leading into it there is Skinker and De Baliviere and Union, then Kingshighway is that way, is that what you mean? Between Union and De Baliviere there are no entrances or crossings except at [fol. 710] De Baliviere; between Union and Kingshighway there is a street enters in there. I have forgotten the name of it.

Q. As a result of that situation the traffic is rather rapid, is it not?

A. It is only 20 miles an hour, I believe. The introduction of such a pier would not at all have a tendency to add to the hazards of that traffic.

Q. You have submitted an alternative sketch, Exhibit No. 29, showing a single bridge crossing the intersection of Lindell and Union; to build a bridge as here suggested would entail the construction of a railroad bridge of a span of about 195 feet, would it not?

A. I didn't measure it. This plan shows a bridge supposing that the track was changed to same alignment as you propose in the City's plan; we will say it is the same as your City plan would be, 200 feet.

Q. Is it practical to build a bridge of that type shown on the picture across the intersection of that span?

A. You could if you have the money and material. Between Union and Lindell on our plans is shown but a single cross section; I don't know whether the distance is about 3,500 feet. It is not necessary to make an estimate of the amount of fill required to raise the tracks in that section from that profile and single cross section because we have the cross sections. I would expect the City's engineers to be able to estimate the quantities of material between Union and De Baliviere from such a set of plans, because between those streets there would be no trouble at all; one cross section would be sufficient because the ground is practically level. I believe possibly two tracks are shown on the embankment. The estimates will show for themselves and will be given you by somebody else. I think my estimates between those points are based on two-track embankment. Possibly the City's plan and estimates are based on the three-track depression between those points.

Q. You own a 60-foot right of way between those points and the Rock Island owns a 40-foot right of way, is that not a fact?

A. I will tell you after the plans showing exact differences are on file; it may be 66 feet; I had an idea our right of way was 66 feet through there, I am not sure.

Q. In the criticisms made by the Wabash witnesses with reference to the City's plan, much attention was drawn to the fact that the City's plans proposed to use both the Wabash and Rock Island rights of way between those points; your plans propose the same thing, do they not?

A. I believe our plans contemplate finally using the Rock Island tracks, property, if the Rock Island is willing to give or sell it. I say again, these are tentative plans which are liable to be changed; it simply gives you an idea of how an elevation of the railroad may be constructed.

Our sketch plan for a bridge at De Baliviere, Exhibit 36, is, in all probability, devoid of any details, sizes, dimensions or data on which an estimate of cost can be based.

On our Exhibit No. 33 we show proposed treatment of the embankment; show flower beds along the embankment. I don't believe those are included in our estimates. That is an artist's drawing; he inserted the flower beds. I said it was a treatment that could [fol. 712] be followed. I have no example of any embankment in St. Louis that is thus treated.

Between De Baliviere and Waterman we probably show only one cross section. I expect our side slopes are shown extending on to the property the City owns in fee. We assumed that the City having bought it for grade separation would necessarily sell it to the railroad for its separation for track elevation.

Q. Your Exhibit No. 38 being a sketch plan of the bridge at Waterman avenue, you show three lines of piers in the street, do you not?

A. One on the curb line and one in the center of the street, very ordinary construction for openings of this nature.

Q. By referring to City's Exhibit 33 and drawing 21 of that ex-

hibit, you will note that the crossing at Waterman avenue is made at the junction of two streets.

A. Yes, I know that. At the point of crossing our tracks are not in a cut; the ground is built up around them. It may be that the depth is four feet below the new surface.

Q. With piers placed in the streets, as shown on your plan, they will be at an angle of about 45 degrees with the main line of Waterman and the main line of Laurel, will they not?

A. You mean the center line of it will dissect the angle formed by the two streets leading to it?

Q. Yes; and placed in a cut with grades of both streets leading downward toward that pier, don't you think that pier in the middle of the street will add a new hazard to street traffic?

A. They have lots of streets like that in other places, and if it was found objectionable and somebody wanted them to change it, you can readily change it. These are simply tentative plans.

[fol. 713] Q. Much criticism has been directed against the City engineers for changing their plans once during this hearing, has there not?

A. The City has been changing its plans ever since I have known of the proposed City plan.

For a distance of a couple of hundred feet I indicate on this drawing grade of five per cent in Waterman avenue. That would make it necessary for vehicles to climb a grade of five per cent for 200 feet, a very small grade. To make a crossing at grade with a railroad track, my drawing does not show alleys running parallel to our tracks and immediately adjacent to them. That is shown on the City's exhibit, showing general situation at that crossing. The change of grade of the street for temporary ramps would require a change in the grades of those alleys; it might involve damages to abutting property; it would be but a small amount.

Q. The present crossing of your tracks with Hamilton now lies on a curve in a cut 10 feet deep with four per cent street grades leading down into it, does it not?

A. It is not in a cut; it is an artificial fill on each side; at one time the level of the surrounding ground was below the level of the track and it has been filled up to that height above the original height of the ground.

Our tracks are lower than the ground; I know that.

Hamilton avenue at that point is on a curve. On Hamilton avenue we show a bridge with three piers in the street. No, a pier in the middle of the street at the sump of a grade of four per cent will not offer an additional hazard to traffic on that street. I have seen a lot of traffic lamps struck and broken by automobiles, but that [fol. 714] must have been done by people who couldn't see, who couldn't steer vehicles. If people are driving carefully, any obstructions built in the City streets do not offer hazards to traffic if there is traffic on the street. I have driven on streets for a good many years and never hit an obstruction yet. I think there is no objection to obstructions provided they are in proper places; the center of the street is the division of the traffic. Traffic lamps are placed in

the center of the street; if they are in the proper location they are not a hazard to a careful driver.

Q. With a structure of this kind built in a street 10 feet below the level of surrounding streets, it would be a dark and probably dangerous place after nightfall?

A. Not if properly lighted by the City. There is no obstruction in that street anywhere else, only the flowerbeds, or whatever it is, at the division of the street.

In showing our embankment between Hamilton and Delmar in all probability we show only one cross section; one would be sufficient there.

Q. Near Delmar boulevard the side slope of that embankment would extend down into the River des Peres, would it not?

A. You understand the present location is an artificial location, whatever it is, it is there. We would have to protect ourselves against it.

Q. If your embankment was built as shown by this drawing would it not extend out and partially fill up the River des Peres?

A. It might and it might not; I have not gone into that in that detail. If that was the condition it would be necessary to build a retaining wall or some other form of obstruction to support our fill at that point. The height of the embankment would not be 22 feet high 100 feet south of Delmar; it is about 20 feet.

[fol. 715] Q. The base of the embankment at that point with a $1\frac{1}{2}$:1 one slope would be something over 45 feet in width?

A. One-half of one plus, you can calculate it yourself. I think the right of way at that point is 66 feet, though I am not sure.

Q. Referring to your Exhibit 4 and the picture which shows a point about 100 feet south of Delmar, it shows the River des Peres cutting very close to your tracks, does it not?

A. It is out at the telegraph pole there. Our fill at a point with that height would extend into the artificial channel of the River des Peres, but it could be easily remedied by taking out this part that has fallen into the River des Peres and pushing the river over. The support necessary is a small detail compared to the total cost; it is not shown there. We have arrived at total cost by giving ample amount to cover any little thing like that.

At Delmar we show sketch of a bridge with two piers in the street and two in the sidewalk lines; the latter are not affected by vehicular travel; it does not affect the vehicular travel.

Q. Don't you think the construction of those piers in Delmar boulevard with its heavy traffic will offer an additional hazard to the traffic along that street?

A. On Delmar in certain portions of it you will find the street traffic fenced off from the street car traffic, and this kind of a plan where there are two lines of street cars makes a very satisfactory plan. The street traffic along Delmar at the point under discussion is not separated from the street car traffic.

Q. The lines of piers in the street would hide eastbound traffic along Delmar from southbound traffic along Hodiamount, would they not?

[fol. 716] A. Not more than a corner of a building; not as much. Traffic between these piers could come right up against them if they didn't drive properly. In a narrowed space it is separated from the buildings by sidewalk space. It would be a little better than an ordinary street. The present sidewalk space on Delmar boulevard is something like 20 feet wide, I believe. Our plan proposes to cut it to 14 feet.

We have not submitted any plans showing the method of treating various industry tracks between Delmar and the city limits. Our estimates showed the cost of adjusting those industries to change in grade. Our estimates were based on reaching the industries as they are there now. We know how much dirt it will be necessary to put in those tracks, if it is necessary to raise them, because the ground is all level practically. We haven't gone so far as to make plans for adjusting those industries. We have all the estimates of cost of reaching the industries.

I have many times made an estimate of cost of raising tracks and adjusting them to industries without having any plans. I don't say that is the kind of estimate that has been brought into this case, but if it were it would be just as good as any other estimate you would make.

Q. The City has furnished a detailed plan showing the exact method of treating the tracks of the different industries, have they not?

A. I don't know that we would follow that plan. So far as the railroad is concerned, it would pay for that cost itself; maybe the industry will have to pay for it; I don't know. We have the cost of that put in.

Q. In comparing your cost with the costs of the City plan, you have included the industries, have you not? In both estimates?

[fol. 717] A. In the City plan I believe you made that estimate yourself and we checked it over; in our plan we are making the estimate and you are checking it over. Yes; I know we have submitted in evidence in this case estimates of our plan and estimates of the City plan.

Q. Your estimates of adjusting industry tracks to the grade you propose have been made without any plans?

A. Our plans are shown on blue prints, if that is what you mean. The plan for bridge over Maple avenue, I think I stated, would be something similar to one of these other bridges. It will doubtless be a concrete bridge.

We are giving the estimates of the whole thing; we are giving estimates to show the difference between the cost in your estimates and ours, but in this hearing I don't believe the Commission will take into consideration the plans in the county. We have nothing but rough sketches. We have not submitted them at this hearing.

Q. On you profile you show your elevated track passing over Etzel at what height above the present grade of the tracks?

A. That is about 12 feet. In all probability Etzel will be depressed or we will raise the track. These are temporary plans. The trouble with you is that you have gone to work and shown that

your grade separation ends at Page avenue. At Etzel it would be necessary to depress the street in order to carry out the plan we show, unless we raise it; the raise wouldn't make any difference. I testified our plan would not involve any change of any City streets; not in the City. I said "City" streets.

[fol. 718] Q. If Plymouth avenue is an important east and west street, and is correctly shown there, this would involve the raising of Plymouth avenue some five or six feet to cross the track at grade, would it not?

A. Yes. If you couldn't raise them, possibly you could depress them so as to get under them. My plan does not show either one way or the other because the City is not interested. We can change it slightly. To change it we would have to bring it up if we are going to clear the grade crossing or bring it down before you get to that street, or put it under the street in order to bring it about without grading.

Q. Does this plan make provision for separating the grade at Page boulevard?

A. That plan provides for separating the grade; it is a wide street; I don't know its width, and the street car line crosses our tracks at grade on Page avenue. I think that ultimately we will have to separate that grade crossing. In all probability the street would go over the tracks. The street running east has a slight grade compared with the rest of the tracks. Located fairly close to the tracks is a large power plant of the Union Electric Light and Power Company, and the construction of the viaduct would necessarily entail high consequential damages to that property.

Q. You are sure that the elevation of the street is much more practical method of separating the grade crossing at that point?

A. I haven't looked into it thorough enough, but I would assume that that would be the more feasible way at Page. I assume that because you know on that profile the streets at both approaches to the railroad track are on an incline and the track is much lower than the top of the hill on each side of the track.

[fol. 719] Q. Isn't it a fact that the street is very much lower than the railroad on the east side of the track, or do you know?

A. On the east side of the track the road is going down in an easterly direction and it meets not very far from there a very steep incline going east. I am speaking from driving over it.

Q. Generally speaking, then, you have submitted no plans for track elevation on which the average engineer could base an intelligent estimate of cost?

A. Oh, I think the average engineer could do it and any man that is used to making estimates could do it readily; if he couldn't, he could go to work and find it out by running cross sections.

Redirect examination by Mr. Hall:

Q. You were asked about traffic on Lindell boulevard east of Union and between Union and Kingshighway, there is a street leading off to the north from Lindell? Then there is an entrance to

Forest Park on the South leading from Lindell west of Union and east of De Baliviere?

A. Yes; there is also this Park way, I think they call it, that leads to Union; that connects Union and Lindell northeast of the intersection.

Q. The question has been asked about the obstruction of the abutments of the bridge it placed on the triangular piece of ground between Park road, Lindell, the company has quite a good sized signal house and tower there, has it not?

A. Yes. I have never heard of any traffic being interfered with or view obstructed at that point by reason of that signal tower there.

At this point an adjournment was taken to 10 a. m., February 7th.

[fol. 720] A. O. CUNNINGHAM resumes.

None of the regular passenger trains stop at Alderney and Glen Echo, nor do freight trains; it is merely a shelter where people flag stations for the Ferguson accommodation. There are no residences in close proximity. It is out in the country.

Q. You were asked about the grades on the Terminal tracks where the Chicago trains approach the bridge across the Mississippi River; those tracks are all in purely switching sections, are they not?

A. Those particular tracks are used primarily for switching movements. There are no residences around there; purely railroad yards and switching sections; those are not Wabash tracks. We use them because that is the only way to get across the river with the Chicago trains going by way of Delmar station.

I have looked into the matter of width of the right of way in the park since I was on the stand yesterday evening. The original right of way through the park, what is now Forest Park, previous to that it was a farm, was 70 feet; at the time that property was turned into Forest Park the Commissioners requested the Wabash to change their line and gave them a 40-foot strip for a track, that is 42 feet to be used for tracks and the embankments were to encroach beyond the 42-foot limit for tracks. Whenever there is a fill in the park that privilege has been taken advantage of. At Grand Drive the winds of the abutments of the bridge extend for a distance of 75 feet, the total width, including the abutments themselves.

I have here a typical cross section of various portions of the embankment which it is proposed by the railroads as the proper method of separation. It is intended to show by those typical cross sections the number of tracks and to show that the tracks are to be elevated.

Q. Are those intended to show quantities of material involved in the elevation?

A. The City has furnished cross sections of ground throughout this grade separation project; with a typical cross section which

shows the number of tracks it is proposed within the area covering that typical section and with the profile, any competent engineer can make proper estimates of quantities of earth. For the railroads to furnish these details would be simply duplicating that which is already here.

In work of this kind it is not customary to work out all of the detailed plans and drawings and specifications at this stage of investigation; any competent engineer could take the profile and cross section and the openings required and make an estimate that would be sufficiently near to determine what the cost would be for the work; in fact, very often we have no plans when we make estimates.

That is the general custom because it is very often necessary to make changes before final plans are approved and final details are approved.

Recross-examination by Mr. Bowen:

Q. The predecessors of your railroad company had no tracks in the territory that is now Forest Park previous to the time it became a park, did they?

A. It was just about or at that time; I don't know, but it is immaterial; anyway the right of way of the Wabash was 70 feet wide [fol. 722] at that time and that was changed under agreement when the park was made. I wasn't there at the time, but I understand that is correct.

Q. You don't know that the Wabash Railroad Company received its right to go through Forest Park by a state statute at the time the park was created?

A. I understand it is now under that right. I don't know anything except what I have heard related by Mr. Pitzman who was the man that surveyed the road.

Q. You stated any competent engineer could make a proper estimate of quantities with the data furnished in the City's plan and the profile and cross section as shown on your plans. The first thing a competent engineer would do would be to draw out the cross sections at the different points on which information has been furnished by the City's—

A. If you have the cross sections of the ground and you know the number of tracks to be placed on the property and know the height those tracks are placed at, isn't it easy to determine the quantity of earth there is in that cross section?

Q. When the engineer is laying out those cross sections, if he finds that his earth would extend into a stream of water such as the River des Peres, he would have to make plans to support that earth, would he not?

A. No, he wouldn't; he ought to have sense enough to know such a small thing as that; there should be an amount of money set aside to take care of those things in his estimate. This particular place you have reference to, I suppose, is 100 feet long.

[fol. 723] S. W. BOWEN, recalled for cross-examination, resumes:

Cross-examination by Mr. L. R. Bowen:

Q. In discussing the settlement of the fill at the Union Avenue Viaduct, you stated that a fill between the retaining walls will settle more quickly than the fill without the retaining walls because with the slopes there is more chance for the lateral movement of material. Just what did you mean?

A. I don't remember testifying to that; I believe it was the other way; it seems to me the fill without retaining walls would settle more than a fill with retaining walls.

Q. For fills such as was placed at Union Avenue Viaduct, what per cent of depth will it settle?

A. It is customary to allow 10 per cent settlement in a fill; I should say though on a case like that with retaining walls, perhaps not more than half that much. That fill was something like 45 feet where the greatest settlement occurred.

Q. That would mean a vertical earth movement at the top of about 4½ feet in its settlement?

A. Ordinarily, yes; I would say in that case that probably two feet would be ample.

Q. Don't you think a fill without retaining walls would reach its settlement more quickly than a fill with retaining walls?

A. No, I don't think so; I don't know if there would really be any difference. Very likely there would be some friction between the dirt and the retaining walls when the dirt was settling. With retaining walls of the type built at Union boulevard in which there [fol. 724] was a sloping side on the earth side, that friction would be greater than if the retaining wall had a vertical face. I don't know that it would delay the settlement; it would reduce the amount of settlement, I would say, because the movement is all in one direction, no lateral movement. As the soil became lubricated with water it would gradually settle, if adjacent to the retaining wall. That friction wouldn't permanently hold the earth against the retaining walls at any particular height.

Q. With those facts in mind the earth adjacent to the retaining wall must necessarily take longer to settle than the earth away from the retaining walls, must it not?

A. I am not so sure about that. I don't think it has been my experience in bridge construction that the earth adjacent to an abutment and retaining walls shows a greater settlement after the pavement has been laid; we usually try to tamp the earth adjacent to retaining walls; perhaps we do that unconsciously to correct that. At Union avenue, however, the settlement spoken of was greatest immediately adjacent to the retaining wall.

Q. That was probably due, was it not to the fact that before the pavement was laid, the balance of the fill had completely settled and that adjacent to the retaining wall had been delayed in its settlement by friction?

A. I don't know; the whole fill was made at the same time and

in about the same manner and I assume there might have been possibly some pockets there that weren't filled quite as carefully as at some other places; there is bound to be something like that.

Q. If a fill were built at Delmar boulevard and if, as proposed by City's plan, there would be nothing to prevent a proper settlement [fol. 725] of a fill, would there?

A. No, except I don't believe that it would be feasible to use much water in making such a fill for the reason that it would probably have to be made with trucks instead of teams on account of the length of the haul, and if you used much water, it would probably swamp your trucks. I am not familiar with the process the City has been using of settling up such fills by forcing water down into the fill by a large pipe.

In causing a fill settle, water is one of the most effective agents; time is the most effective. Time gives it a chance for the soil to become filled in or packed in naturally. You might be able to use some water to help out, but as I said, it would be very difficult to make such a fill with trucks and use much water.

Q. On the Twelfth Street Viaduct which your company built, there was no temporary roadway built over the fill, was there?

A. I don't know.

Q. You don't know, then, whether the pavement was laid immediately after the completion of that fill or whether the fill was settled by artificial means?

A. My recollection is that the fill was made; in the first place the fill wasn't deep, the fill was made about the first thing and therefore it had a good chance to settle before the rest of the structure was completed. The Twelfth Street Viaduct carries a very much greater amount of traffic than the Union Avenue Viaduct; it was built a little bit before the Union avenue. I never noticed any serious settlement on the Twelfth Street Viaduct.

Q. You spoke of the temporary roadway to be built north of Delmar, was that idea original with you?

A. I don't know that it originated directly with me, they discussed [fol. 726] it with me. No such roadway was built at the Union Avenue Viaduct. No such roadway was built at the Twelfth Street Viaduct, it wasn't necessary to build one there because there were bridges above and below it. By "above it" I mean Eighteenth street and by "below" I mean Fourteenth street, both in the same direction. The Fourteenth Street Viaduct is two blocks from the Twelfth Street Viaduct.

I wouldn't say there is considerable more traffic over the Twelfth Street Viaduct than there is across the Delmar avenue crossing. I don't think a temporary roadway, such as proposed at Delmar was built to carry the traffic at the time the Jefferson Avenue Viaduct was constructed.

Q. Do you know of any time during the construction of viaducts in St. Louis when a temporary roadway was built to handle the traffic such as has been suggested at the Delmar avenue crossing?

A. If it could have been built, it no doubt would have been; it is very desirable to take care of the traffic the best way you can. I

don't recall any such instance. I was not with the Fruin-Colnon Contracting Co. when the sinking of the piers of the Twelfth Street Viaduct was made. I believe that method of supporting bridge piers has been used by the City quite a number of times since.

Q. You stated that the unit prices used by the City in its estimate of excavation for the piers that extend to rock was not sufficiently high; do you know what price the City used in its estimate?

A. I don't remember exactly, I think about \$4 or \$5 per cubic yard. That price of \$5.00 to \$6.00 per yard I have suggested, how- [fol. 727] ever, is an average unit price for all foundation excavation, including the shallow excavation up to two of three feet, also including the deep pier estimate. I wasn't on the Twelfth Street Viaduct job, but I got around there occasionally and I have access to the unit costs on that job; they ran at that time, on that job, close to \$4.00 a yard, at this time it would be at least double that, so that a bidding price on excavation of that character, those small piers today would run about \$10 per cubic yard.

Q. Do you know that the City's estimate assumes that it would get 30,000 yards of earth from the United Railways for 50 cents a cubic yard?

A. No.

Q. Do you think that was a reasonable calculation based upon a letter from Mr. Perkins, receiver of that company, quoting the City that price?

A. Yes, if you have absolute information that you are going to get it at that price. I don't think our company relied upon the United Railways Company of St. Louis for that amount of earth in one year for executing a piece of work.

Q. Don't you know your company took a contract to fill Oakland avenue at the south side of Forest Park for 49 cents a cubic yard and all of the dirt was placed by the United Railways Company and that that work was done in the twelve months' period between July, 1917, and July, 1918.

A. No.

Our company does very little work in the last five or six years for which it is paid by special tax bills. Prices bid for special tax work are usually higher than prices bid for work that is to be paid for in cash.

Q. The City figured on 20,000 yards of free dirt; is that an unreasonable amount to expect at that location?

[fol. 728] A. It is at this time. I don't know that the City has any more exceptional means for finding out where excavation is going on than the contractors. I know S. H. Bickley, a dirt contractor of St. Louis. If I had a contract with him to furnish all the dirt required at cost of freight for delivering, I would use that in preparing my estimate. I have never known him to handle anything but cinders.

Coming to unit prices furnished the Wabash, I assume no responsibility for the quantity used in connection with prices supplied by me. I haven't checked their estimate. I am responsible for my part of it. I have checked their method of application of prices I

furnished to the units they estimated. I have only two prices for excavation; one for \$1.75 per cubic yard and one for \$5.00 to \$6.00 per cubic yard, the latter marked "foundation excavations." I think that estimate is proper. The excavation for both of those footings would be a trench 14 to 15 feet wide and 400 or 500 feet long and the earth would simply be thrown out of the trench to one side and would not be moved subsequently. That would be ordinary grading for most of that work and shaping up the cut afterwards. The price I estimated on that part of the work was \$1.25. My estimate of \$1.10 per cubic yard for filling Delmar Avenue Viaduct was based on obtaining the material from a borrow pit and hauling, loading it with a steam shovel, landing by truck. I figured the borrow pit would be located within a radius of a mile and a half. I believe the Wabash had some site in mind for the borrow pit.

Q. Do you know of any viaduct that has been built in St. Louis in which such a borrow pit was purchased?

[fol. 729] A. No, I don't know that it has been necessary; in the instance I have in mind, at Union Viaduct, there was plenty of excavation right along the side they could use. We did not do the filling there, the Terminal Railroad Company did it.

I have an item of \$13.00 per cubic yard for concrete. I think that is an average mix of 1:2 $\frac{1}{2}$:5; there are all kinds of mixes from 1:2:4 up to 1:3:6. The concrete used on work of this kind would not vary a great deal in cost, except with the difference in the cement put in. The most modern method is to reduce the number of different mixes as much as possible. I don't remember but two classifications of concrete on the Union Avenue Viaduct; one in the retaining walls and the other in the span across it. There may have been another, I don't remember it. In arriving at price of concrete you must to an extent know the amount of the different kinds of concrete that go to make up the work; in arriving at that, I had to use estimates furnished by the Wabash.

I have an item of rerolled rails at 4.6 cents per pound and an item of \$3.00 per cubic yard for ballast; that is, crushed stone. I don't think all the ballast under the Wabash track is cinder ballast; I only examined it casually; it looks like rock to me.

Q. If it should be proven that it is entirely cinder ballast between Union boulevard and city limits, and it was desired to reproduce the same ballast they now have, you would have to change that item, would you not?

A. I believe also there is an item there for cinder ballast.

Q. Your price for wood block paving, what is that based on what depth of wood block?

A. Four-inch; I thing four-inch wood blocks were used on the [fol. 730] Twelfth Street Viaduct. We didn't do any paving on Union avenue. I am not an expert on wood blocks, but my impression is that it is four-inch. I might say those wood blocks and other paving prices are based on recent bids which the City obtained during the years 1920 and 1921.

Q. If the City has not laid any four-inch blocks in the last ten years and your estimate is based on four-inch blocks, it couldn't be based on recent City estimates, could it?

A. No, I guess not.

Q. Coming back to your price of \$1.75 per square yard for excavation, was that intended to be graded; the roadbeds?

A. That was intended for steam shovel excavation in the cut and included expenses connected with it, such as track work, maintaining track, loading, hauling, distributing and rehandling off the side of the dump. I have a detail at the office of items that go to make up that estimate of \$1.75. That is an average cost for the job. It might vary some; I don't think there would be a great deal of difference. I did some work for the Terminal in which they lowered some tracks. This figure is based on that.

Q. Do you believe that if the City should let the contract for the Delmar Avenue Viaduct, as it usually does such work, to the lowest bidder and the different utilities took care of their own functions as their franchise requires them to do, it would cost the City a million dollars?

A. It might not cost the City a million, but it would cost somebody a million dollars. My answer is based on the assumption that the figures furnished by the Wabash engineer are correct. If it should be shown that those quantities are incorrect, that would change my answer.

[fol. 731] I was asked to make an estimate of cost for the entire City plan for the City of St. Louis.

Q. The City of St. Louis gave you a set of plans and asked you to figure quantity cost and everything and simply give it the statement of entire cost of the work, did it not?

A. I believe you approached me with such a proposition as that, or started to. I found that other arrangements had been made and returned the plans to you. Before I found those arrangements had been made, I agreed to do that.

All of the work our company gets from the City of St. Louis it gets in competition with other contractors. We do not do any work for the City of St. Louis on a cost-plus basis. Our company has done some work for railroad companies on a cost-plus basis.

Mr. Senti:

Q. I believe you stated you had done considerable public work for the City?

A. Yes, we have done some work for the City. I should say our company has done work for the City for probably thirty years. I am familiar with the practice of the departments of the City in letting work. I believe in those cases where the City lets contracts for public work it is their custom to make an estimate of costs prior to letting.

Q. Do you know what has been the experience of your company with reference to whether the actual cost of construction usually exceeds the estimate or is less?

A. Sometimes it is more and sometimes it is less.

Mr. Haid:

Q. Do you know of any specific case where the actual cost exceeded the estimates? I was asking with reference to bridge work?

A. Well, the Free Bridge is one. I don't remember what the [fol. 732] City's estimates were on highway bridges such as Twelfth street or Jefferson avenue, so I cannot answer that.

Redirect examination by Mr. Hall:

Q. I understand that the City authorities and Mr. Bowen, the engineer of bridges and buildings for the City, had enough confidence in your judgment and experience as an estimator to come to you and ask you to estimate on the cost of this work?

A. They seemed to have. Some arrangements had been made by my company which I didn't know about at the time prevented me from going ahead with that plan of the City.

Q. You were asked about instances in which a temporary roadway had been built to take care of traffic during construction work. You remember, do you not, when the Bevo Plant was built that traffic was diverted into the street car traffic for some time?

A. Yes, they built a temporary bridge over the approaches there; that is always a desirable thing to do whenever you can do it. In cases like Twelfth street and Compton avenue it is impossible to do it. It would be a very simple thing in the case of the viaduct along Delmar as proposed by the City.

All these unit prices are based on actual cost of similar work we have done on bids when we have been the lowest bidder.

Q. Some question was raised in the examination of Mr. Cunningham with reference to the fact that the railroad had not submitted any detailed plans upon which the estimate were based. I wish you would state to the Commission what your experience is with reference to making of estimates on such information as has been submitted to the Commission?

A. We frequently have to make estimates without any detail plans in particular in railroad work. At present we are making a bid on about thirty miles of road on which there are a number of bridges and culverts. The only plans we have are a profile and alignment plan; from that we have to dope out our quantity and submit our figures. In making that estimate we haven't as much information as has been submitted in connection with this work before the Commission. I should say the amount involved will run over a million dollars. It is a railroad in Illinois. It is my experience that that method is common on railroads in general.

Mr. Bowen:

Q. In connection with the Bevo Plant, not only one but two streets would have been blocked up by that construction had not the temporary bridge been built, would there not, Mr. Bowen?

A. Yes. Broadway and Sixth street would have been blocked—I

mean Broadway and Seventh would have been blocked, and you would have to go to the next street west.

Q. And the streets east of Broadway, if any, would have been blocked because of the depression of the tracks in there, would they not?

A. Second street would have been open. That is about a block from there. The track depression I spoke of on which my experience was gained was a yardage price.

The work I am now figuring on where we have but a profile is a railroad out in the country. We haven't in that project any artistic bridges, but we have a number of bridges merely represented by an opening.

[fol. 734] W. W. HORNER recalled.

Mr. Senti:

Q. You testified in reference to the probable flood conditions at Delmar avenue in case of a repetition of the 1915 flood after the City's plan for building the viaduct at Delmar was carried out, did you not?

A. Yes, I did. I made a study of the probable flood conditions for a repetition of the 1915 flood if the Wabash plan for eliminating the grade crossing at Delmar avenue was carried out.

Q. State to what elevation the flood waters would rise at Delmar under the Wabash plan of elimination of the crossing at Delmar avenue, and the one immediately south of there by the Wabash plan of elevation?

A. If the crossing at Delmar was eliminated by the Wabash plan and we had a repetition of the 1915 flood, the water at Delmar would rise to an elevation between 82 and 83. The water would stand about eight feet deep on Delmar avenue.

In the studies that were made before for the elimination of the Delmar crossing on the City's plan it was shown that if the Wabash right of way was cut off from the River des Peres so that all of the flood waters were forced down by the River des Peres channel and with some modifications and channel improvements in the vicinity of Delmar, the water would rise there to about 83½. Under similar conditions Mr. Burdick, testifying for the railroad, indicated it would rise to about 86. Under the Wabash plan it was impossible for water to rise that high because neither the Wabash Railroad nor the streets on the east side are entirely cut off from the River des Peres; after the water in the River des Peres has reached an elevation of about 80.8 it will be flowing small streams down both sides of the Wabash fill; that is, it will occupy the property not filled up by the elevated track. It will also have begun to flow through the streets from Washington Heights toward De Baliviere; we have collected the amount of flow for an elevation of 82 and find the relief afforded by these streets and the ditches along the Wabash

was not sufficient to carry the flood, but the elevation 83, it is slightly more than sufficient, so you can state rather definitely that the water will be between 82 and 83 at Delmar.

Q. With the repetition of the flood of 1915, the conditions that you have just outlined and water standing at Delmar avenue about eight feet, how would the Wabash tracks be affected?

A. The Wabash tracks would have been elevated above the flood level at Delmar and for some distance south of Delmar; in fact to a point between Waterman avenue and De Baliviere avenue, but the water would be flowing along the side of the tracks southerly from Delmar and through the streets.

In Washington Heights there would be heavy streams, particularly in De Giverville and Nina place, and that water would be discharged back on the tracks at a point south of Waterman and flow along the Wabash tracks at a point south of Waterman and flow along the Wabash tracks to De Baliviere avenue, at De Giverville the remaining water would come flowing through the streets of Washington Heights, would also flow on the tracks, and the flood at that point would be like in 1915, except the amount of water would be greater. [fol. 736]

Q. What would be the result about 1,000 feet (point) north of Delmar avenue?

A. Under the Wabash plan for Delmar avenue the grade descends northwardly at about 1,000 feet north of Delmar near Cates avenue, the grade of the tracks would be below the high water of such a flood as has been described and from (point) distance north the grade of the track would be under water.

It has been shown that the grade of the Wabash at Olive Street road is at an elevation of 77.5; the water would stand on the track about five feet deep. They could not operate through five feet of water.

Operating conditions, as I see it, would be equally as bad as in 1915; the water might be deeper at some points; in either case it would be sufficient to stop operation of trains.

Conditions of property other than the Wabash would be more seriously and probably be damaged to a greater extent; the water to Delmar north of that would rise to a higher elevation and flood more property, and the flooding in Washington Heights' would be greater because of a greater number of streets carrying off the water, and to a greater depth.

I have made a plat showing the comparison of the areas that would be flooded under the conditions just outlined with those which prevailed in 1915. I have it with me.

City's Exhibit No. 132 marked.

The areas showing in yellow on plan are the ground covered with water in flood of 1915, when the water reached an elevation of 75 at Delmar avenue; the additional areas in red would be the ground flooded under the conditions I outlined, that is, for the [fol. 737] grade at Delmar, if eliminated by the Wabash plan, and with the water reaching a point between 82 and 83 at Delmar. The additional red in Washington Heights shows the number of streets

that would be carrying water as compared to only two of them affected in 1915.

Q. What would be the condition of flooding with a repetition of the 1915 flood if the Wabash plan for eliminating all the tracks were carried out, if eliminating all the grade crossings were carried out?

A. The Wabash Railroad would be elevated out of the water entirely; it would be completely protected; but the effect on private property would be more serious because of the closing of a number of openings by which this water escapes from Washington Heights to get back to the River des Peres.

Under the City's plan for eliminating the Delmar crossing alone, a repetition of the 1915 flood would cause a flow of water very similar to that of 1915, except that the culvert at Delmar, which the City included in its plan, would slightly improve the flow conditions along the River des Peres, and might lower the water level.

Under the Wabash plan for eliminating the crossing at Delmar the conditions are as shown on that exhibit; the flooding would be higher than in 1915 by a considerable amount.

The completion of entire City plan, eliminating all grade crossings, it has been already shown the water at Delmar avenue would not pass over the embankments which were proposed at that point; it would be confined entirely to River des Peres.

Under Wabash plan the conditions should be as outlined, except [fol. 738] that the flooding conditions around De Baliviere avenue would be more serious.

L. R. Bowen:

Q. In describing the comparative conditions after the execution of the City's plan, and after execution of the Wabash plan, you stated the water would not go over the embankment provided in the City's plan at Delmar; you mean if the City's plan was executed in advance of the construction of the River des Peres?

A. Yes; but if the River des Peres sewer is built before the balance of the City's plan is carried out there would be no flood problem whatever under that condition; the River des Peres sewer would completely care for all storm water.

Q. I believe a part of the plan for taking care of the flood conditions at Delmar contemplated the construction of a culvert southwardly in the eventual construction of the River des Peres sewer. To what extent, if any, could this culvert be utilized?

A. The culvert could be entirely utilized and no part of this construction would be wasted. Plans for the culvert show that the walls are founded on solid rock; the culvert is the same width as the proposed River des Peres sewer; the only difference would be that the flow line of the culvert would be the bed of the River des Peres, while the flow line of the River des Peres sewer would be lower. To make the culvert compare with it, you have to move the rock and put in a new concrete work to conform to the grade line of the River

des Peres sewer. That type of construction is quite common; it was used in connection with increasing the capacity of the Mill Creek sewer, the Rocky Branch sewer over considerable lengths, and re-[fol. 739] cently in connection with the culvert in the Terminal Railroad to the north Harlem Creek sewer.

The fact that the foundation of this proposed culvert would be on solid rock would make it much simpler than ordinary to utilize the sewer.

Recross-examination by Mr. Hall:

Q. Will you state to the Commission why the flood area would be increased if the Wabash track should be elevated at Delmar according to its plan?

A. The reason is very simply; that the Wabash Railroad would not be available to carry away excessive waters to the extent it is today.

Q. Exactly; it is very simple and very clear. So long as the City of St. Louis undertakes to make a drainage channel of the Wabash Railroad Company's property it is a desirable thing to be accomplished.

A. No, I don't know that the City had anything to do with that.

Mr. Rodehaver:

Q. It is more desirable to use the Wabash or the streets?

A. I suppose that is the point of view; I think the property holder would prefer to use the Wabash.

I don't think the City of St. Louis uses any railroad right of way for drainage purposes. I think in cases of unprecedented storms, and the natural channels are insufficient, then the lowest ground becomes the floodway.

Commissioner Bean: I would suggest that you not take more time on that, Mr. Hall.

Mr. Hall:

Q. You referred to the City's plan for the River des Peres culvert or inclosure at Delmar, which one of the City's plans did you refer [fol. 740] to, the one that extended that inclosure of the River des Peres or the sewer of the River des Peres, about 200 feet south of Delmar, or the one that extended it south to Kingsbury boulevard, or the one that extended south to Waterman avenue?

A. I didn't refer to any particular one; the type of culvert is the same in each instance. I was asked what was necessary to adapt the culvert to the River des Peres sewer.

Q. You know that the City of St. Louis has voted against the proposition for money for the River des Peres construction or control, do you not?

A. There was a bond issue lost by a very small vote.

Q. Then this map that you have just prepared assumes that the

City will do nothing whatever to control the water condition at the River des Peres if the railroad plan is adopted and the tracks elevated?

A. I made no assumption in that regard at all; I simply acted on the Wabash plans, which show nothing in the way of improving the River des Peres channel.

Q. This plan presented here is based upon the assumption that the City will do nothing whatever to control the water at Delmar, is that it?

A. No; it is based upon the fact that the Wabash plans for elimination of grade crossing at that point show no betterment of the channel.

Q. You are basing that diagram on the assumption that there will be nothing done and the outline in red is on that assumption, is it not?

A. I can only act on what is shown in the Wabash plans. It is not shown there.

[fol. 741] Q. This blue print 132 doesn't contemplate an effort on the work on the part of the City of St. Louis to control the water of the River des Peres at all, does it?

A. It doesn't contemplate any effort on the part of the City to any extent; it is purely a Wabash proposition. I did not suggest that the Wabash is responsible for the control of the water of the River des Peres at Delmar boulevard.

Mr. Bowen:

Q. Was there any other time in the history of St. Louis that you know of when the Wabash tracks at Delmar boulevard were flooded by the River des Peres?

A. I don't recall any.

Mr. Rodehaver:

Q. At the time of that flood, didn't part of the embankment protecting the Wabash Railroad from the River des Peres wash out?

A. There was considerable of the bank washed out along the River des Peres along the Wabash side. I have seen no work done there. Another flood such as in 1915 will make conditions as they were in 1915.

N. JOHNSON resumes.

Cross-examination by Mr. L. R. Bowen:

Q. You stated that the City's plan takes the railroad to the City limits and leaves it there at a different grade from present grade, did you not?

A. I think so; it is a fact. I think the tracks are brought down to present grade somewhere in the county. I forget just at what point. I think detailed estimates of the costs of bringing those tracks down to present grade are also furnished in the City's Exhibits. [fol. 742] It is a fact that in the City's plan several thousand feet

of piling is provided for bridges, not retaining walls, at Delmar boulevard and Olive Street road.

Q. Did you mean to convey the impression that the City's plan should provide for walls for piling under the retaining walls shown along the railroad right of way between Union and De Baliviere avenue?

A. With those retaining walls setting in wet ground, as they would be in a good part of that territory, it would be necessary to have piling.

That is due to insufficient support at the toe of the retaining wall of the soil conditions. I have made no tests of the character of the soil at that point. I directed the work of making the million-dollar estimate for the bridge at Delmar boulevard. I have not had experience in building bridges in St. Louis. I am not, strictly, a bridge engineer.

Q. You say you made this estimate and then called in Mr. Bowen to check the prices and made such alterations as he deemed advisable; did he find any of your prices too low?

A. There were some prices revised after his examination of the estimates; I think there were some too low. At the time I made these estimates I had complete detailed estimates that the City had furnished of the viaduct at Delmar boulevard.

Q. Take the City's estimate of the viaduct of Delmar Boulevard Exhibit No. 31 and the Wabash Exhibit 47, showing your various estimates; the estimates furnished us yesterday by your attorneys are quite different from the estimates you had testified about previously, are they not?

[fol. 743] A. There isn't much difference; we made the original estimates rather under pressure somewhat hurriedly and since the last hearing we went over these estimates more carefully and comparatively speaking, they are not very great.

Q. Your estimate for the cost of Delmar boulevard has been reduced about \$65,000, has it not?

A. Yes, sir. The unit prices used in this estimate are the same as used in estimate previously furnished you. This is the first time we have furnished a detailed estimate in this case. The previous estimates were only summaries because our details were not in satisfactory shape at that time.

Q. Referring to your detailed estimate of the viaduct at Delmar, your first item is for the temporary relocation of Delmar boulevard, \$57,262?

A. Yes, sir. We propose to relocate Delmar boulevard on the north side of Delmar avenue, and outside of the limits of the work in connection with the approaches to the bridge. That is part of the City's plan, but not of the City's method.

Q. Is that customary in building street bridges in St. Louis?

A. We feel it would be necessary and practical at that point in order to take care of the traffic while the work was going on. There are quite a number of streets south of Delmar boulevard. It is two or three short blocks to Kingsbury boulevard.

I have made no estimate and furnished no detailed plan of the

relocation of that street. I have not furnished any detailed estimate of the doing of any portion of that work.

If it was decided that that temporary street was not necessary, we could take about \$57,000 from our estimate.

[fol. 744] We have not submitted any detailed estimate of property damages.

Mr. Bowen furnished us with some of the unit costs of damages. I have had no experience in the City of St. Louis in determining damages to property caused by a grade or a change in the grade of the street.

I do not claim to be an expert on real estate values, we have used real estate appraisers in connection with this property damage work. None of them have been called before the Commission to testify on that particular subject.

Q. Your next item is an item of embankment, 124,786 cubic yards; I note that item is considerably in excess of the amount estimated by the City of St. Louis and of the amount estimated by the contractor employed by the City to prepare an estimate of the Delmar avenue viaduct; explain how you arrived at that figure?

A. We used the City's plan and worked up the quantities from the City's plan as we understood it. We used the same side slopes that the City's plan showed and arrived at that estimate. We have the details in our office.

Q. Your next item of "Borrow Pit," \$30,000—where do you propose to locate the borrow pit?

A. We don't know; we will have to go out and buy the borrow pit, but the exact location we are not prepared to disclose what we have in mind, for business reasons. We arrived at that estimate on an acreage basis based on the amount of yardage and the depth to which we could make this borrow pit. I don't recall the price we figured per acre. I have no figures with me here. I do not know whether [fol. 745] the City of St. Louis has ever bought a borrow pit in building its viaducts. If this pit were located on the Wabash right of way within a reasonable haul, there would be no charge made for a borrow pit. It may be that all along the Wabash Railway, and along the Terminal Railway in St. Louis there is a lot of property that is unsuitable as industrial property because it is located too high above the railroad tracks.

Q. If such a borrow pit were purchased and used and its grade reduced to the grade of the railroad tracks, could it not be sold for a greater price than originally paid for it?

A. Possibly could, but for a job of this kind you would have to figure out your outlay and couldn't tell what you would recover from salvage, if any or how much; it would necessarily have to be charged against the job for the time being.

Q. Refer to quantities shown on City's estimate and quantities shown on your estimates for several items that go to make up the cost of the Delmar avenue viaduct. Take the item of "Brick Hand-rails," you have 297 lineal feet, do you not?

A. Yes, sir; and the City's estimate is 270 lineal feet.

Q. If you take 10 per cent of the City's estimate and add to it, you

will arrive at exactly the estimate you have handed in for the brick handrail, will you not?

A. Approximately—299 against 297.

Q. Take the next item, "Concrete Handrail"; you have an estimated length of 561 lineal feet and the City's is 510; add 10 per cent and you will arrive exactly at your estimate for the length of the handrail, will you not?

[fol. 746] A. Yes, sir. The next item, "Concrete Curb and Gutter;" our estimate is 946 lineal feet. Take 10 per cent of the City's estimate and add it to the 860 lineal feet, we arrive at our estimate of the curb and gutter.

Q. Take "Reset Curbing," estimated at 1,727 lineal feet, and the City's 1,507 lineal feet, and add 10 per cent to it, you will arrive at your estimate of the reset curbing?

A. Yes, sir. The next item is "Cement Sidewalks" and the City's estimate is 58,900; add 10 per cent to that and you will get our estimate. The next item, "Granite Curbing;" the City's estimate is 1,830; add 10 per cent and you get 2,013, and that just happens to be our estimate on granite curbing.

Mr. Hall:

Q. You just added 10 per cent to each item as you went along instead of adding it at the end? That is all the difference?

A. Yes, so each item would stand by itself.

Mr. Bowen:

Q. What is the idea in adding 10 per cent to every quantity the City has put in its estimate as to quantities; didn't you estimate those quantities at all.

A. We estimated these quantities and they checked fairly close with the City's estimate. We added 10 per cent as we checked because we wanted each item to stand by itself and any item could be corrected or eliminated without changing the whole estimate. It is customary to add 10 per cent to quantities that you find for contingencies and it can be done either by taking the quantities you find and carry them out and adding 10 per cent to the total amount or take 10 per cent of your quantities and apply the unit price and carry them out and add it without the 10 per cent at the bottom, but the reason we did it this way was to let each item stand independently [fol. 747] so if it was changed we wouldn't have to change anything except the footings or if it is eliminated, we wouldn't have to change the 10 per cent at the bottom; it simplifies any difference in estimates after they are made. We have added 10 per cent to the quantities of every estimate on this job after they have been computed.

Q. On a job of this size, according to your estimates, that would be an item of several hundred thousand dollars, wouldn't it?

A. It would.

Q. And after adding that you have added to that a percentage at the bottom or end, haven't you, for engineering?

A. That is for engineering; that is not contingencies.

Q. The City's estimate did not agree in exact detail with the esti-

mate made by the contractor, yet your estimate with the 10 per cent variation did agree exactly with the contractor, did it not?

A. I did in a good many cases; where we found the contractor was very close to us, we took his figures instead of putting up an independent figure which might vary from it slightly.

At this point an adjournment was taken to 1:30 p. m.

Mr. W. W. HORNER, recalled for cross-examination.

Mr. Hall:

Q. You previously testified the River des Peres sewer as provided for in the City plan would in your judgment completely eliminate the danger of an overflow or flood of the river such as that in 1915? [fol. 748] A. I did. The construction of the complete River des Peres sewer system would give a satisfactory drainage to any plan that has been mentioned. We have presented a complete plan and also certain modifications in the way of constructing additional culverts in connection with the Delmar plan alone. If that was carried out to the extent indicated in City's plan it would not completely solve the flooding troubles, if the grade crossing was carried in Delmar as the Wabash has proposed; if you will remember, it was testified to both by myself and Mr. Burdick, with the culvert extended to Waterman, the water elevation would be about 80; now that would be somewhat over the roadway in this scheme; it would not, however, flood Washington Heights.

Q. Where would the water go under the City's plan in case of a recurrence of the flood of 1915, with the improvement of the River des Peres as you have contemplated in the plan submitted?

A. It would all go through the improved River des Peres.

Q. What is there that would prevent it all going through the River des Peres if the tracks were elevated at Delmar instead of being depressed?

A. It would all go through the River des Peres, but in doing it, it would rise to the same elevation as before, about 80, which is higher than proposed roadway of Delmar under your elevated tracks; you see in the City plan Delmar avenue is carried over and that is an embankment around it, which prevents it doing any damage; in the Wabash plan the railway would be above 80, but the roadway of Delmar would not. As I recollect the elevations, there would be about five feet of water standing along Delmar avenue; with the same [fol. 749] improvement of the River des Peres, the water would be at the same elevation in both cases, but in one case the improvements would be entirely out of the water plane, but in the other they would not.

Q. It would be discharged more rapidly and get off of the roadway more quickly than at present?

A. Yes, that would be true; the improved channel would carry it away faster.

N. JOHNSON resumes.

Cross-examination by Mr. Bowen:

Q. You have an item of 8,382 linear feet of foundation piles in connection with the Delmar avenue viaduct; does that include the piles on the City's plan or are you figuring on other piles than are shown on the City's plan?

A. It includes those and more of them. We figure the City's plan did not provide enough piling under those walls. I think it is proposed to place additional piling along the Hodiament side. I don't remember the exact number of concrete piles the plans provide.

Q. By what method of computation did you arrive at the result that warranted you in stating that required the additional amount of piling under that wall?

A. By the ordinary method of retaining wall construction, pile foundation. I expect we figured the load on those piles; I don't recall the details at all; we would figure the load if we designed it for more piling. I don't recall what spacing of piling we used, nor the load we figured per pile. It seemed our estimate would provide [fol. 750] for about two and one-half times as much piling as the City's plan shows.

Q. The City's plan provides for the spacing of four and one-half foot centers; that would mean a spacing closer than two feet on centers, wouldn't it?

A. Possibly; somewhere between two and three; it is practical to space concrete piles two feet on centers. This Telephone Company's expense, \$55,000, is an item of cost; that was given in the testimony by the Telephone Company's witness here at the last hearing. The item of \$31,100 for the United Railways expense we worked out with our own forces, and after estimate had been made we asked them for an approximate figure, and they advised us it would be about \$30,000, so we didn't change our estimate. I think that includes the paving in the tracks and between the tracks and outside of the tracks. They have a paving now between the tracks in its present location. I think there is some kind of paving between Rosedale on the west and De Giverville on the east; the street is paved.

That item of \$31,100 includes the cost of building their tracks on the new Delmar grade; it does not include any temporary construction on a temporary highway. I did not figure all new rail for the United Railways Company's tracks if it were built on the new grade.

We have no item in there for sodding the side slopes of our railroad embankment. They would not be sodded here because most of that will be rebuilt when the final plan is carried out. The portion between Delmar and Hamilton would not be affected by the completed plan.

[fol. 751] O. You have in there an item of additional right of way, \$19,000; is that supposed to represent the cost of the land the City

owns in fee between De Baliviere and Delmar that might be occupied by your side slopes?

A. It represents a major portion of those two strips—not all—but the major portion, used for this first step of the program; the balance should be included in the other estimate. There would only be the part of the east end where we taper off to De Baliviere that we would not use, and it should not be chargeable to this estimate. We figured on cutting the land off square at a point where we wouldn't need any extra right of way, and in using the balance of those two strips in the other estimate.

We have no estimate of damages for the change in grade at Waterman avenue or the four east and west alleys running into Waterman; when that plat was laid out it was with the understanding that the City could change the grades at Waterman and Kingsbury for a distance of 200 feet each way without involving any property damages. It does not specify whether it is temporary or permanent change of grade, but that is probably the arrangement at that place.

Q. How did you prepare an estimate of the cost of this work without detailed plans?

A. We have good maps of that territory and accurate profiles and cross sections; with that information we prepared what we call "Estimates of Cost." We did not include in our estimate of cost of the Delmar avenue viaduct the cost of changing the United Rail- [fol. 752] ways bridge over our tracks just east of Waterman. It would have to be changed. That is a feature we overlooked in this estimate.

Mr. Hall:

Q. That bridge of the United Railways tracks over the Wabash tracks just east of De Baliviere is not involved in the Delmar separation proposition at all, and it was not overlooked in any estimates you made on Delmar?

A. It was not included in the Delmar-Hamilton projects.

Mr. Bowen:

Q. If your track is raised, as shown on your temporary plan between De Baliviere and Waterman, wouldn't it be necessary for the United Railways Company to either raise that trestle or take it down?

A. It might be necessary to raise it slightly, but, as I recall it, the run-off there would be pretty close to the present elevation under the street car company's bridge. I don't recall that we submitted any profile of that run-off at this hearing.

Q. Mr. Cunningham testified, I believe, that its eastern approach would be on a 1 per cent grade?

A. Yes, sir, and that grade runs out close to De Baliviere, and that trestle is something like 300 or 400 feet west of De Baliviere.

Q. In your estimate of the cost of the City's plan, you have an item of \$440,000 for temporary tracks; isn't it a fact that the City's plan shows only 1.4 miles of temporary operating tracks between Union and Delmar and in the detailed method of construction pro-

vides for two miles of a temporary work track to haul your dirt to Delmar?

A. I don't recall the details of the City's estimate. I expect it would make a total of 3.4 miles of temporary track; at the rate of [fol. 753] \$140,000 for 3.4 miles of temporary track, that would make temporary track cost about \$130,000 per mile; we figured more temporary tracks than the City; in our temporary tracks we have to build a lot of trestle in order to support the tracks on the slopes of the cuts that are to be made through in accordance to the City's plan. The City's plan proposed to take the tracks off of the slopes and in the alleys; we have no means of determining how much it would cost to run our tracks through the alleys and close them for a period of two years or more, so we, in order to be able to prepare an estimate, kept our tracks off the alleys and provided for a trestle to take care of the tracks on this slope. We didn't assume anything; we were unable to arrive at a cost of occupying and using the alleys for that purpose, but more than that, since the City made their estimate, there have been garages built on private property which the City contemplated using part of the way for this track immediately west of Union avenue, and also a garage on the east side of De Baliviere.

Q. None of these garages, however, were built in the public alleys, were they?

A. No. These garages are built on private property, property which the City contemplated using for these temporary tracks, but did not provide for compensation for, so far as we could see; the garages have been built on this property; they would have to be destroyed, and rather than get into this complication, we based our estimate on keeping out of the alleys and keeping all our work on the property that was given up to the railroad. On this we figured on using rock ballast throughout.

[fol. 754] Redirect examination by Mr. Hall:

Q. In taking care of the run-off at the point where the street car tracks cross the Wabash west of De Baliviere, resulting from the Hamilton-Delmar separation as proposed by the railroad, would there be any interference at all with the street car bridge or trestle over the railroad? Have you got the details in mind as shown by the profile?

A. Yes; I don't think that we would have to do anything with that bridge; we have quite a bit of clearance there now, and we would probably have to jack it up a little, but it wouldn't amount to very much.

We have something like twenty-one feet clearance there now, and the run-off would raise the tracks there two, possibly three feet. We assumed the street car track would not be disturbed until the final plan is carried out. I think we have a profile here on a small scale.

Mr. Bowen:

Q. In your estimate for the Railway Company's complete plan you have an item adjusting industries to the change in grade amounting

to \$55,900—you have an estimated cost of \$55,900 for adjusting the industrial spurs to your changed track grade; how did you prepare that estimate without any detail plan?

A. We worked that out from our maps and profiles; it was not necessary to have detailed plans, because it is brought about by trestles in some places and some of these industries we don't have to disturb under our plan; the Polar Wave we don't disturb, because we get down to them on an incline starting from Delmar. I mean it is not necessary to prepare a plan to show how to adjust tracks [fol. 755] to industries leading from a railroad track some twenty to twenty-two feet higher than the original grade of the tracks to those industries, in order to get an estimate, because your maps and profiles give you all the information you want. Some of these tracks can be left in their original location; the Polar Wave is the big industry in our territory, and under our plan we won't disturb their spurs at all.

The cost of adjusting the trestles to the industries of \$100,400 is brought about largely by the fact that the Polar Wave would have to be raised according to the City plan and they constitute a large part of that section. The average elevation of the tracks north of Delmar shown in the City's plan averages less than half of the elevation between Delmar and city limits, to which we propose to elevate the tracks.

Q. You propose to elevate the tracks twice as much as the City does between Delmar and the city limits, and yet the cost of adjusting the industries to the raised tracks is only half as much as in the case when it is elevated twice as high; is that right?

A. Yes; that is because of the fact that under the City plan we propose to build a dike or wall on the west side of the Wabash tracks from Delmar to Olive Street road, which would prevent a lead track along the slope to reach the ground at Polar Wave tracks. I think I stated clearly that the City's plan contemplates a wall which would necessitate raising the Polar Wave tracks to practically the height of our elevated tracks in that neighborhood.

[fol. 756] I think the City furnished detailed plans showing just how these tracks would be carried into the industries. We have furnished no plans whatever showing how we adjust those industries to our raised tracks; the difference is in the methods of handling the work. But we don't show our method.

Q. In your estimate for the Wabash final plan, did you take into consideration the cost the United Railways would be put to in changing the bridge west of De Baliviere avenue?

A. No; we did not. There would be considerable cost to them; it was a feature which we discovered after these estimates had been written, and inasmuch as the City's estimate did not provide for it, we left it in that way; they should provide for it, but they did not. The City's plan certainly would make it necessary to change the United Railways walls. You would have to provide, if you were to leave the street car tracks up in the air, rearrange their support; you would have to build a different bridge across from what you have now and presumably it would be lowered to the ground line; there is

no occasion for having it setting up there twenty-five feet in the air above the ground when the track is down at the bottom.

Q. While there might not be any occasion for it, the depression of the track wouldn't require the trestle to come down, would it?

A. It would require a rearrangement of the supports.

Mr. Hall:

Q. This forenoon Mr. Bowen was calling your attention to various items in which your totals were just 10 per cent larger than the City's totals. You found, did you not, that the City, instead of adding 10 [fol. 757] per cent to each of the various items, had totaled them all and then taken 10 per cent of the total and added it, getting the same results as you had gotten by adding 10 per cent to each of the separate items; is that correct?

A. Yes; that is very common practice—universal—of adding 10 per cent contingencies at the end of an estimate; we just added it by one method and they another; we got the same result.

The first straight direct thoroughfare south of Delmar is Lindell. Hamilton and Kingsbury, where they cross the Wabash tracks, curve at the right of way line and make quite a decided jog there and then go on east again. These streets are quite winding and irregular.

Q. There are a number of private garages, are there not, along the right of way there near De Giverville and south of Delmar that would be involved in the change of the temporary tracks, the construction of the temporary tracks along the alley there?

A. Yes; they would be shut out from access from the alley if a track were laid in the alley. That is the only way they could get out, so they would be absolutely put out of use during the entire time that tracks were put through there; that condition exists back of De Giverville from a point just a short distance east of Delmar to near De Baliviere avenue, south of Delmar.

We have in our office all the underlying supporting data; it is very voluminous, and we didn't feel it was necessary to file it with the Commission; it is there and available if desired.

Mr. Rodehaver:

Q. About the alley up De Giverville avenue, do you know whether [fol. 758] all that property is built clear up to that alley line?

A. No; you have back yards there, but generally speaking, the garages set on or very close to the alley line.

Q. You say "generally speaking;" do you know it to be a fact there are about five feet inside of that alley line, instead of "generally speaking"?

A. There are some of them on the alley line, but they are not uniform; in and out. I couldn't point out to you those that are exactly to the alley line, but I have been up through the territory several times; I don't know it to be a fact that up a block from Hamilton avenue to Delmar not a single back fence is built to the alley line.

C. P. RICHARDSON, recalled.

Cross-examination by Mr. Bowen:

I have testified that the estimates testified to by the witnesses for the Wabash were extremely conservative.

Q. Were you referring to the estimates for the Delmar viaduct, the City's plan of track depression or the Wabash plan for track elevation?

A. They all used the same unit prices, and my remarks refer to all of them. My idea as to conservativeness was based on the unit prices, quantities, and more particularly on account of the conditions under which the work was to be done. I have not made a check of quantities.

Q. Then you can have no judgment as to whether or not the quantities are correct or not?

A. I wouldn't say that; I could say they were reasonably correct; [fol. 759] I have made similar estimates on similar projects.

Q. In estimating the quantities to go into a structure, do you arbitrarily add any percentage to the amount of those estimates?

A. You either add them to the quantities or to the money at the end of the estimate. We don't add them to the quantities as a general rule, only for convenience; I have done it at times.

Q. When you did add it to the quantities, did you turn around and add a percentage after you had the totals?

A. I add engineering expense, if that is what you refer to. I have gone over the City's estimate for that work; there are so many parts that I don't believe I have as connected a remembrance as I have of the Wabash's estimate. I would say that the quantity was not very much different; the main difference in the two estimates is the additional items that were omitted by the City. That is the opinion I got from an examination. The items omitted were temporary tracks, temporary trestle, care of traffic during the construction, care of public utilities and other minor items; those come to my mind. I have examined the railroad company's plan for track elevation in detail. They are sufficiently complete for my uses; much more than I had on a similar project some years ago that has now been completed in Chicago. Our company did not make detailed plans before they started the work on that project; I might also add that the work was delayed on account of the non-completion of the detailed plans throughout the work. That does not necessarily cost money to start work without complete detailed plans.

[fol. 760] Q. It is perfectly practical, is it not, to raise a railroad track under traffic and place an earth fill under the track?

A. Yes, sir.

I have examined the railroad's estimate of the City plan, in which an item of \$440,000 appears for a temporary track amounting to 3.4 miles, and would say that was conservative for restricted right of way. I understand that eight-tenths per cent is the maximum grade shown on the City's profile. I recollect it is half to three-quarters of a mile.

Q. You stated in your testimony that if it were short, it could be neglected, what do you consider short?

A. Three or four or five hundred feet, within a train length, would be up and down over it. I would say the total length of the eight-tenths per cent grade on the city's profile was less than a mile.

Q. You understand that the Wabash now has a grade on a similar stretch of 1 per cent between Grand drive and Lindell at the end of present elevation, in the same stretch of track under discussion?

A. Yes; a temporary run-off from the elevation. I wouldn't want to say that that stretch of track is 2,000 feet long without referring to the plan.

Most terminal districts are termed switching districts; at the present time you couldn't call this territory a switching district, but the possibilities are very great.

Q. I show you City's Exhibit 124, which shows the grade of the Rock Island tracks running westwardly from De Baliviere and ex-[fol. 761] tending out to Bonhomme road; I ask you if on that stretch of track you have half as much track less than the maximum grade shown in the City's profile as you have track that has a grade in excess of the maximum grade shown on the City's profile?

A. This is a heavy grade section which is undeveloped country, which is subject to revision and is not to be compared with a fully developed part of the City. I would say between Clayton and Pennsylvania, it was not as much developed as between Pennsylvania and De Baliviere. I believe there is a very fine residence district immediately west of Pennsylvania avenue.

Q. In that location you have a grade of 1.44 per cent?

A. That is the original grade. Generally speaking, this stretch of track is a very bad stretch of track. I have heard that the City has been endeavoring to get the Rock Island to abandon that stretch of track and bring its trains in another way.

Q. That would be a very good thing to do, would it not?

A. That would depend on investigation made as to the possibilities of reducing and improving that grade line. I have not examined into those possibilities.

Q. Do you call this grade running westwardly here from De Baliviere avenue and climbing this 90-foot hill a velocity grade?

A. I wouldn't call it an ordinary velocity grade; if they have sufficient speed they can go over that hill and do it every day; the same engine stopping on that hill might not be able to start up, but in a moving train it can go over the hill.

[fol. 762] I have no detailed plans for lowering our track in connection with proposed depression of the Wabash at De Baliviere. I arrived at estimate of cost from a profile, ground line. I proposed to lower present facilities, I mean two tracks, three tracks and four tracks, according to the number on the ground at present, but no future development. One track at De Baliviere; the range of the distance is two, three and four. The other tracks which have been there for a number of years are for switching purposes.

Q. Isn't it a fact that a number of those tracks haven't been used in years?

A. I don't know how many years, but it is a fact that the Wabash at present, so far as my knowledge goes, is doing the switching for the Rock Island; that might be terminated, though, within thirty days, on notice. I would say we have use for one track in addition to the single main track we use now. In our estimate of connecting with the Wabash main track we figured on lowering all tracks; I would not consider any plans for the future of throwing away any facilities we have found use of in the past, and without doubt, will find use for in the future.

That is how I arrived at my estimate of \$500,000. Our two passenger trains each way daily get along very well under present 18-foot clearance over the Wabash tracks.

The clearance used in grade separation work I spoke of at Seventy-ninth street in Chicago was seventeen feet three inches, seventeen feet was the plan. I have never heard any remarks about that railroad structure except about the clearance.

[fol. 763] Redirect examination by Mr. Hall:

Q. The information that was used in making the estimates that have been submitted here is of the character such as is used in making estimates for work of this kind by railroads generally, is it not, and construction engineers generally?

A. There is no question about that.

Q. There is nothing mysterious or concealed or difficult about this method by which you and Mr. Johnson have made up the estimates you submitted, is there?

A. No. I might add there is more information than I usually have in preparing similar estimates. A mere clerk who was simply acting as a computer might have to have more information than has been submitted, that is the reason we have engineers who have had previous experience and don't need the detailed plans.

E. R. KINSEY, being duly sworn, testified as follows:

Direct examination by Mr. Senti:

I have already testified in this case.

I am familiar with the topographical conditions of the surface of the area south of Delmar in the vicinity of the tracks of the Wabash Railroad Company as they formerly existed and as it does now.

I am familiar with it, first, from personal observation, having been engaged in work on an adjoining property for three years, during which time this entire area was graded; being engaged in similar work, I was interested in what was going on, and had frequent occasion to inspect it and transact business with those engaged in grading the property.

I wish to refresh my memory and make use of a topographical survey made by the City of St. Louis about thirty years ago. It

took three years to complete it, and the maps have been published and are issued as an official publication of the City. I have tested and proved its accuracy. The accuracy of the survey is beyond question; it is accepted by everyone who knows anything about such work. That is Colby's Survey.

The published maps of that survey are contained on numerous very large sheets; it happens that this section comes on four of those sheets, and it would have been inconvenient to bring all four of those large sheets here, so I had this map compiled by tracing from those four official sheets the contours shown there, and that work was done under the supervision of Mr. E. J. Jolley, who personally made most of the surveys and personally made the original official contour maps; this blue print shows his certificate signed by him, stating he has compared this with the original and it is true copy of the original.

In the valley occupied by the Wabash from Delmar southwardly it shows that the Wabash tracks cross at Delmar on grade then as now and that at a distance of about 250 or 275 feet southwardly from Delmar, the tracks crossed a small draw or ditch about twelve feet wide, two or three feet deep; from there southwardly for a distance of what appears to be on the map 500 or 600 feet, the tracks lay practically on the surface; the rails were about two feet above [fol. 765] adjoining land, just about the space that would be occupied by the ballast under tracks. Conditions there were not as described by Mr. Rochrig, there was not there a low, swampy area; for a long distance the tracks were either close to original surface or in a cut at a point near where Waterman avenue, if extended, would have intersected the tracks; they again crossed a little ditch about ten feet wide and three feet deep; from that point southeastwardly the tracks were originally in a cut excavated through a hill there; the Wabash grade shows a slight summit in that hill between Waterman and De Baliviere; the high ground on each side of that cut has since been removed. The material along the railroad and in that entire vicinity is very hard clay, harder than we usually find in St. Louis. The character of the material can be understood when I say that banks absolutely vertical, twenty to twenty-two feet in height, stood in that position for a year or more without appreciable sloughing off.

The proposed depression of tracks in accordance with plan submitted by the City would result in this, that commencing from Delmar, at which point no depression is planned, going southwardly, the depression gradually increases; proposed lower grade of tracks would take the tracks down into this hard material which I have described, and for its entire length from Delmar to De Baliviere, with a possible exception of the two places where ditches were crossed, the new grade will be on the hard, firm clay which exists in that neighborhood and will not be on a swampy quagmire, as [fol. 766] has been described by a former witness. The character of the material is such as to justify no fears as to a large amount of influx of seepage water.

Q. You spoke of your experience in removing portions of that soil. How was that obtained?

A. This grading work in question was carried on during the years 1901, 1902, 1903 and 1904, at which time I was engaged on the World's Fair grounds; among other things I had charge of and moved about 1,000,000 yards of the same kind of material on property immediately adjacent to this; I had conversations with the contractors and had ample opportunity to observe and ascertain the character of the material through which this proposed work will have to be conducted.

Cross-examination by Mr. Hall:

Q. This work you did in moving that dirt during the World's Fair was largely filling-up process, wasn't it?

A. You can't fill a hole without digging some place, and the material came from excavation.

Q. You used the dirt that you moved to fill up low places, didn't you?

A. Yes; that always happens when you move dirt. You must deposit it some place. It was a double purpose, both tearing down high places and filling low places.

Q. This contour map shows that between the Wabash tracks and Pershing avenue and the River des Peres the contour line was 63 for a large area in there doesn't it, around Waterman and Nina place and Laurel?

A. Sixty-six, you mean, do you not?

Q. I find right in Waterman avenue, just west of Waterman way, 63 and then I find just east of Waterman way and north of [fol. 767] Pershing, 63; do you find them? That is pretty low ground in there, isn't it?

A. That is the low ground southwest of the Wabash tracks; that low ground can hardly be said to have extended to the Wabash tracks, because it headed up into a little draw passing beneath the culvert which I described before as being near the intersection of Waterman, if extended.

Q. It is that low ground that drains and kept dry the ground on which the Wabash existed then; you show the elevation of the Wabash tracks in that vicinity at 68 to 69, but the land adjacent to the tracks varies from 66 to 63, does it not?

A. No, sir; 66 or more; the only place you will see 63 is just at the culvert to which I referred; in the ditch, I may say.

Q. These two places I called your attention to, an elevation of 63 south and west of the tracks, and then right along the tracks on either side of them, you have an elevation of only 66, haven't you?

A. Sixty-six, yes, sir; it does not vary from 63 to 66 along on the south and west side of the tracks; it is 66 along the track, but the 63 contour simply passes through under the culvert and heads up just beyond the railroad track. The contours show the elevation.

Q. Let us refer to the place where the street was vacated crossing Nina place near the intersection of Nina and McPherson there.

A. That area in there varies in elevation between 63 and 66; the intersection of McPherson and Nina originally was about 64½ or 65. This map shows all of the contour lines that the original [fol. 768] plats in the City Hall show; the certificate of Mr. Jolley, who made the map, certifies to that fact.

Those dotted lines are streets that were originally laid out and then vacated; that is the original street layouts, for convenience I have placed the full lines the present street layouts as they now exist.

Q. What experience have you had in excavations along the Wabash tracks or in the immediate vicinity of the Wabash tracks, say, extending from Kingsbury boulevard southeasterly to Waterman in the vicinity of Nina place or Laurel?

A. None at all; so far as I know no one has excavated there.

Q. So your experience in the discovery of this exceedingly hard clay foundation is not in that immediate vicinity? I am asking about your experience; I understood you to say you had some experience?

A. I will give you some experience, then. The River des Peres itself has excavated in some of that ground just south of Delmar, and it has washed out up almost to the Wabash right of way, and an examination of the bank against which the River des Peres is now cutting shows that same hard material which I have described as prevalent through there. The point described is 100 feet or so south of Delmar; that is about 1,600 feet from Nina and McPherson.

This map I have just shown is drawn to a scale of 200 feet to the inch.

Q. I notice that east of De Baliviere avenue, you show on this map elevation of 60, 63 along the railroad tracks. That is correct, isn't it?

A. Yes; I presume you are referring to the old ditch which existed at that point.

[fol. 769] Q. I notice the figure 63 seems to be some distance from any ditch; for instance, just east of De Baliviere and south of Pershing and then in De Baliviere in the neighborhood of Waterman, I notice quite a number of lines there of 60?

A. You will find that elevation along the ditch east of De Baliviere. You are tracing out some low ground at an elevation of about 60, which forms a part of a ditch which flowed southwardly about parallel to and passed through a culvert underneath the Wabash tracks.

Q. You call that space 150 or 160 feet in extent a mere ditch, do you, or would you call that low ground?

A. Oh, it is low; I don't care what you call it; it is about 800 feet away from the Wabash.

The work I personally had charge of was south of the Rock Island tracks; the information I have concerning the character of the material was gained and can be gained just as readily from observing another man's work as my own, but I know the character of the material from watching the excavation of it when it took place, and I can still learn the character of it by examining where

the River des Peres has cut into the original soil adjacent to the Wabash tracks.

Q. Just where was this 1,000,000 yards of dirt you moved south of the Wabash tracks?

A. That covered the World's Fair site in various parts of it.

Q. You were there simply cutting down the hills and filling up low places, were you not, in order to get comparatively level surface?

A. No; I reversed that process and dug holes and built hills; for instance, in the excavation of the lagoons, I dug a hole and built the hills on the side of it and moved dirt both ways.

[fol. 770] "City's Exhibit 133" was marked.

L. S. ROBERTS resumes.

(On the part of the Southwestern Bell Telephone Company.)

I believe I submitted three plans by which the Telephone Company could take care of their construction to meet the viaduct proposed by the City; the plan that was most desirable from the Telephone Company's standpoint was to allow the conduit to remain in its present location, providing certain modification could be made in the City's plan for the enclosure of the River des Peres; this plan entailed an expenditure on the part of the Telephone Company of about \$11,000; in going a little further into this matter, I find that in case these modifications cannot be made in the River des Peres, it is possible to raise the elevation of the Telephone Company's subway over the top of the arch of the River des Peres; this would involve the construction of a new line of subway at the new elevation, the running of new cables through this one section and the removal and abandonment of the old subway; this would entail an additional expenditure on the part of the Telephone Company of about \$12,000, making the total cost of this project about \$23,000; this, of course, would be the most desirable plan for the Telephone Company.

[fol. 771] I also want to say that since testifying at the previous hearing I have seen the Wabash plans, and it appears from these plans that one of the footings will probably be over our line of subway; of course, this subway is not designed to stand any weight, and it would be necessary either to modify the footings so as to clear the subway or reroute the subway.

Mr. Bowen:

Q. What would rerouting of your conduit cost, if it was found necessary to be made to clear the Wabash bridge footing?

A. It would mean the construction of one section of subway, about 190 feet, running in of new cables, somewhere in the neighborhood of \$12,000 to \$15,000.

Mr. Hall:

Q. The conduit could be run through the footing very easily?

A. Providing that no weight was carried on the conduit.

Q. Certainly; and that is done very frequently, is it not?

A. But such construction would mean some modification over the present plan.

Q. It wouldn't involve any expense whatever to the Telephone Company?

A. Providing the weight was taken off, it would not.

Rock Island Exhibit No. 4 offered.

At this point an adjournment was taken to February 27th, 1922

C. P. RICHARDSON, on behalf of the defendant C., R. I. & P.

Cross-examination by Mr. Senti:

I submitted an estimate of the cost of connecting the Rock Island tracks up with the Wabash after the change in the grade both on [fol. 772] depressed and elevated plans. Estimates submitted covered work primarily from De Baliviere avenue to Skinker road, inclusive, including a run-off in addition for the Rock Island track between De Baliviere and Union.

Q. The quantities upon which your estimates were based, were they the actual quantities or was any percentage added?

A. As I recall, 10 per cent was added. I have used the present arrangement of the tracks; cross sections were made and used in the estimate. These cross sections were taken between De Baliviere and Pennsylvania avenues, from 200 to 300 feet apart.

Q. The estimate you have submitted, then, is based upon replacing all of the existing tracks within this area?

A. It varies; one main track and in different parts of the territory it ranges from two to four tracks. Some of these tracks are temporarily unused, due to the Wabash doing the switching for the Rock Island in connection with the industries. Possibly some sections of the rails are taken out in some of the tracks. West of Skinker road there are two tracks for a distance of about 600 feet. I wouldn't want to say whether those tracks are in use; they are not extensively used on account of the switching of the industries being done by the Wabash at the present time. That is a temporary arrangement.

Q. Your estimate includes not only the changes necessary to connect the tracks of the Wabash with the tracks of the Rock Island, but also the elimination of your grades to Skinker road, your grade crossings, do they not?

[fol. 773] A. Yes, and based on plans presented by the City under Exhibit No. 56; that would include the elimination of the grade crossing at Pennsylvania avenue. No; it does not; it is a run-off, as previously stated, from Skinker road to present grade. If, as a matter of fact, we depressed only a single track of the Rock Island to connect with the Wabash, I would say it would cost in excess of \$50,000; I wouldn't want to estimate the cost, as it wouldn't be considered by any railroad.

These unit prices are taken from the unit prices used by the Wabash in their estimates. I didn't take into consideration where it would be necessary to remove this earth only that I figured that we were very conservative, and I did not add on any cost to that unit price to cover that. I just accepted the unit price of \$1.75 per yard, arrived at by the Wabash Railroad Company. In my estimate of our Item 4, that figure was arrived at by the same method, by using the Wabash unit prices.

Q. You have a difference of 75c per cubic yard in the cost of removing the earth from the cuts and in your estimated cost of placing the earth in the fills.

A. Practically 78,000 cubic yards less excavation than there is embankment. I did not figure the 75c a cubic yard more net for moving this earth than it would be in making the fill, because I have an item in there for "Borrow Pit," which puts that price up to within about 25c, I think; excluding the borrow pit, there would be a difference of 75c per cubic yard, and the estimated yardage is 215,000 cubic yards. This would make a difference of \$161,000 some odd.

[fol. 774] Q. Then your Item No. 15 on elevation, you show the cost of raising the bridge at \$6,000; where is that bridge located?

A. River des Peres; it is so labeled. We figured on building up the abutments with possibly a little reinforcement on the back to take the load off; that would not necessarily necessitate a reconstruction of the abutments from the base up; I think that work could be properly done without reconstruction of the abutments at the base. We figured on raising the bridge about 15 feet at that point.

Our Item 15 on the depression estimate shows \$35,000 for temporary bridges to be put at Skinker road and De Baliviere avenue.

In our Item 7, track depression, we have \$29,700 for foundation piles under the retaining walls and abutments at Skinker, as I remember. On the plans submitted the location of retaining walls is not indicated; in Item 7, we show \$3,325 for foundation piles under the retaining walls; the plan does not show location of those walls. I might add that the question of cost between track elevation and depression scheme on the Rock Island line is not an important one; it is a question of operating grades and these estimates were not gone into with the detailed and thorough study that would have been required if it was an essential question with the proposition. I consider the City has taken that same viewpoint, inasmuch as they haven't submitted any estimate covering that.

Q. As a matter of fact, a detailed investigation of the cost of the two proposed plans might show that the cost of depression would be [fol. 775] practically the same as the elevation, might it not?

A. Eliminating the drainage, otherwise not. You must take care of the drainage in the track depression plan that you do not have to do in track elevation. It stands out strikingly.

Our estimate shows an item of \$15,000 for sewers and water mains on the depression estimate; I had in mind Skinker road.

In our Item 21, on the cost of depression, we show \$5,000 for industries; as I recall it, that is the coal track at the University; I show it less in the depression than I do in the track elevation.

In our Item 22 we show train service, \$10,000; there is an estimated train service due to the work in a depressed cut requiring considerable extra expense. We figured the expense in the elevation of the tracks that was in the cost of the fill; that is an item that would be increased on a depression scheme, and rather than increase the unit cost of the excavation, I have shown that separate item.

In Item No. 17 I show cost of paving the greater part of Skinker road and a small portion of De Baliviere, \$40,000. That is assuming that Skinker road is to be raised, as I recall, two, three or four feet, according to City's Exhibit No. 56.

Q. Would it be possible to route your passenger trains over the Wabash from Page avenue during this reconstruction, or would it be practical?

A. It wouldn't be considered in making an estimate, as we don't know even the year we would be doing this work; the traffic may be entirely changed and the conditions altogether different than at the present time.

[fol. 776] I am familiar with the plan which the City proposed to reroute the Rock Island trains permanently over the terminal. There is a very expensive connection to be made at Page avenue, which, if made with a satisfactory grade, is quite an expenditure of money required.

On the third page of my estimate, the second item, "Total Expenditures," includes the expense as detailed from De Baliviere to Skinker, and the additional amount there would necessarily be expended between Union and De Baliviere. I am positive the Pennsylvania crossing was not included in the estimate I gave.

Mr. Rodehaver:

Q. Did I understand you to say that all the figures you have given there would be eliminated, providing the Rock Island rerouted their trains via Page avenue?

A. If the route was abandoned, yes; the expenditure between De Baliviere west would be eliminated, not from De Baliviere to Union. You understand me correctly to say that there would be a very expensive overhead crossing to be made at Page. The Rock Island at present owns their right of way from De Baliviere to Skinker. It is a very valuable piece of property. The evidence in this hearing would not signify that the sale of that property, if abandoned, might more than pay for the connection.

Mr. Brown:

Q. On the question of rerouting those trains you stated, I believe, it would eliminate all that expense, that is on the assumption that you wouldn't have to pay anything for running over the Wabash Railroad, isn't it?

A. I took the question to mean construction, not operating expense.

Q. But if you were required to detour your trains, then the cost of

[fol. 777] detouring would be an expense that was made necessary by reason of construction work, wouldn't it?

A. Yes, and probably amount to a considerable amount; it would be an annual expense, which, capitalized, would give a justified construction expense. There is no way that I know of where we could force the Wabash Railroad to handle our trains from Page avenue.

Mr. Senti:

Q. How many passenger trains does your company operate daily over this track about which you have been testifying?

A. At present four trains; two outbound and two inbound. Our company is a member of the Terminal Railroad Association, I believe. I couldn't say whether they have a right to run into the Union Station over the Terminal tracks at the present time.

Mr. Burns:

Q. You spoke of there being a question of grades more than of expense of the two methods, that is, raising or lowering the tracks there; explain that fully; so they will catch just what you mean as to the question of the grades going up there from De Baliviere west across Union and Skinker and the River des Peres and on west to University avenue?

A. I mean that on City plan of depression the grade proposed on Exhibit 56, which is our only plan, the Rock Island grades ascend abruptly on a 1 per cent grade to the River des Peres, then descend on approximately a five-tenths per cent grade to Skinker road, then ascends again for some way over a mile on a 1.08 per cent grade, which replaces at the present time the same distance of a grade ranging from three-tenths to nine-tenths per cent grade. It is apparent [fol. 778] that a roller coaster grade up and down would be necessary to reduce the initial cost of construction and at the same time it causes an annual expenditure for increased cost of operation, which, if capitalized, would make a considerable difference in the costs; it does not show in the actual quantities figured from the plans, but it is there just the same and should be given consideration and would be figured there for all time as an operating feature if this plan of the City were adopted.

AUGUST MANEGOLD, being duly sworn, testified as follows:

Direct examination by Mr. Senti:

I reside in the City of St. Louis, with office at 211 Title Guaranty Building. I am in the contracting business, and the name of my company is the Manegold Contracting Company; it is a co-partnership, and I have one-half interest. I have been operating with this company three years. Our company has done grading work in the City of St. Louis within that time.

Q. What jobs of grading of any size has this company done in the last three years?

A. We are working on a job now on Skinker Hill, about 120,000 yards, and the Southern Wheel Company; we did a job for that company at Euclid and the Terminal tracks in 1919, about 100,000 cubic yards. On the Southern Wheel, we obtained 20.9 cents per cubic yard. The following year we done a job for the Bulis Manufacturing Company at Penrose and Geraldine avenue, at 50c a yard; [fol. 779] the same season we done a job for the Davis Realty Company, at Good-fellow and St. Louis avenues, about 40,000 or 50,000, at 44c.

I am familiar with what is known as the De Mun tract.

I have been in the grading business in St. Louis thirty years. Prior to the present copartnership formation I was with the Manegold Contracting Company for a period of six or seven years. I did contracting for grading during that time.

I have seen this De Mun tract. I done a little work there last spring; it is located on the west side of Skinker road between Hillcrest Subdivision and Hi Pointe; Hi Pointe is at Skinker and Clayton roads and the De Mun tract is immediately north.

I am familiar with conditions at Delmar avenue and the Wabash tracks. I looked at the site there with a view of making an estimate of filling with earth obtained from the De Mun tract, and I have given the City an estimate of the cost of making the fill with earth removed from the De Mun tract. I have examined the plan of the City covering the work at Delmar and the Wabash tract with a view of ascertaining the manner in which the dirt was to be placed there and have seen the layout there. I gave the City a price of 80c, a yard for placing the earth in the fill at Wabash-Delmar from the De Mun tract. I figured on moving a minimum of 60,000 and a maximum of 110,000 yards. In giving that estimate, I included such profits as our company usually makes on a contract of this size.

Q. I will ask you whether or not your company would be willing [fol. 780] at the present time to enter into a contract with the City to place this earth in this fill at the price you have named?

A. Yes.

Q. And you would be willing to furnish the City with the customary bond for the prosecution of the contract?

A. Yes, sir.

I am familiar with the tract on the Terminal known as the "Roeller Tract"; it is located on the Terminal belt near the United Railway right of way. I have seen the location. I examined a plat of this property furnished me by the City. I made an estimate for that, too. I made an estimate there to load it on the cars at the Roeller tract and unload the cars at Delmar and Wabash tracks; the cost of loading is 20c, a yard, and the cost of unloading is 40c, a yard; this 40c, for unloading includes placing it in the fill; I figured on 60,000 yards minimum.

I am familiar with the character of soil adjacent to the Wabash from south of Delmar avenue. I was in charge of the Parkview Realty job of the Pitzman Company of Engineers and Surveyors in 1901, 1902 and 1903, while this work was going on. The Pitzman Company were the engineers for the owners, and I was Pitzman's

superintendent. At that time the Wabash was on a fill from Delmar to Waterman and from De Baliviere to Waterman; it was in a cut.

Q. In the course of this work, in which you were in charge for the Pitzman Engineering Company, did you build the new channel for the River des Peres?

A. Yes, sir; I was personally in charge of the work.

Q. What kind of soil is there adjacent to the right of way of the Wabash south from Delmar to De Baliviere, adjacent to the Wabash [fol. 781] from Delmar and De Baliviere, the general nature of it?

A. Black soil and yellow clay; the black soil is on top; the yellow clay is on the bottom. When this new channel of the River des Peres was constructed I should judge it was about 15 feet from the Wabash tracks to the bottom of the channel. This excavation for the new channel was made with teams and wheelers; that is not a practical method in swampy land.

Q. When you speak of clay having been encountered in the vicinity of the Wabash Railroad track, I will ask whether or not that is such clay as is ordinarily encountered in the City of St. Louis in making this excavation?

A. About the same formation; yes. We graded the under crossing of the Suburban Railway at the Wabash. I had a contract to grade out and cut under the Wabash tunnel, you might call it; I think the per cent of grade was about $3\frac{1}{2}$ or 4 per cent from Union avenue, west to a distance of about 500 feet, where we crossed under the Wabash. That was done in the spring of 1904, and it was very wet; it was a rainy month and rained almost every day; we had five or six foot of fill on that and the material was very wet, and we had some difficulty getting through there; and after we got down eight or ten feet we discovered a brick sewer running over from what is now Pershing avenue, and we opened that up and it was full of water, and after we got our tunnel through under the Wabash, we got fairly good drainage to a bridge that is under the Catlin tract, but it was a very wet season, and we were in the mud there most of the time.

[fol. 782] Q. In making this excavation from the new channel of the River des Peres, aside from the places where it was necessary for you to cross the bed of the old channel, was the clay that you encountered wet or dry?

A. Well, it was damp; of course, on that depth all clay is damp, but it was very good working material for all teams; if it was boggy or marshy, you couldn't work teams in it.

Mr. L. R. Bowen:

Q. This cut that you dug under the Wabash tracks was the natural slope of that cut, such that the cut acted as a drain for the surrounding territory?

A. As well as I recollect, I think there was six or seven foot of fill there and the fall of the balance of it was solid material on a slope. The tracks sloped $3\frac{1}{2}$ to 4 per cent down from Union avenue.

Q. In times of heavy rain, water on Union avenue would drain down into the cut?

A. Water from all that territory run that way mostly to the fall of that cut. Before this cut was built under the tracks there was a sewer extending under the tracks at that point, I think, in making this cut we encountered this sewer.

Q. And this old sewer, after the cut was made, continually furnished water into the cut?

A. Yes; there would be a stream of water running out of the old brick sewer. After we had passed through the fill that was over this old sewer, we struck hard clay in the bottom.

Cross-examination by Mr. Hall:

Q. I understand you to say that you were working in mud most of the time when you were doing that excavating?

[fol. 783] A. Yes; part of that was filled. I was talking about making an excavation under the Wabash tracks for the Suburban railroad tracks; I worked in mud most of the time I was doing that job; that is correct.

Q. Of course you were working in mud, because it was wet there; that was the reason it was muddy?

A. Well, yes.

Q. Now, you said that the excavation of the River des Peres channel which you made could not have been done with teams if it had been wet. How did you excavate this roadway for the Suburban tracks under the Wabash?

A. With slips, drag scrapers with long chains on them, with teams. That cut was possibly thirty feet wide, and we had chains on the slips, and we kept the teams on top of hard dirt.

I stated that the Wabash tracks at that time in 1901, from De Baliviere avenue to Waterman avenue, were in a cut of possibly three or four feet; I don't think deeper than that. That cut began about Waterman avenue and run east; there was no cut at De Baliviere; there was a little fill at De Baliviere. I should judge the cut that was three or four feet deep was about 700 or 800 feet. North of Waterman avenue it was on a fill of six or seven feet up to Delmar.

Q. You didn't do any excavating in the vicinity or immediately adjacent to the Wabash tracks; south of Delmar the Wabash track turns toward the east away from the new channel of the River des Peres, did you?

A. No, sir; nothing but the channel. The River des Peres channel was made new and straight from a point a few feet south of [fol. 784] Delmar clear to the Rock Island tracks. We did not deepen the channel below what it was normally.

I recall that high earthen embankment just south of Delmar and on the west side of the River des Peres. Some of it is made; not all of it; some of it is topped off; I guess there was six or eight feet cut into the River des Peres channel into that dirt and the fill was put on top of that.

Q. That bank shows that there was a fill made there?

A. Part of it; not all the way down to the river. On the east side of the Wabash tracks it is made earth there. They are not natural embankments on either side. I have known that land south

of Delmar and the Wabash tracks since 1901. I gave some prices for work I did for the Southern Wheel Company in 1919 at 20.9 a cubic yard; it was about 500 feet wide and 1,800 feet long.

Q. Was it practically a uniform excavation over that space?

A. Yes; it was excavated for a car wheel site. That was leveling down.

Q. That is a very different process from excavating a cut eighteen or twenty feet deep and fifty or sixty feet wide?

A. Why, yes; it is a cheaper class of work certainly. I am now working on Skinker Hill, west of Skinker road; my price on that work was 20c a yard; simply leveling down over a wide area. I spoke about filling Delmar boulevard; it is elevated with earth from the De Mun tract, at 80c a yard. I am assuming the earth from that tract would be available in sufficient quantity to fill the Delmar viaduct elevation at the time it was to be elevated. If it were done [fol. 785] immediately, we would do it for 80c a yard, getting the earth from the De Mun tract. I allow nothing for the cost of the earth. I do not take into account that in furnishing that earth for the Delmar viaduct fill, we would get something for moving it off of the De Mun tract.

Q. Of course, you have no right or arrangement for taking the earth from the De Mun tract?

A. Not any more than the City of St. Louis has a permit, I presume, to take that earth. I understood that through Mr. Pitzman last Friday or Saturday. The De Mun tract is west of Skinker road between the two subdivisions, Hillcrest and Hi Pointe; part but not all of it is within the City limits; the distance of that haul is about 9,000 feet. The Roeller tract is on the Terminal Railroad, just east of the United Railway crossing. I should judge that would be about two miles from Delmar and the Wabash tracks. I said we could load it for 20c and unload it into the fill at Delmar at 40c a yard. I don't know what the transportation charges would be on that; I have not figured it. I know it would require the installation of a switch at the Roeller tract for loading purposes and at the Wabash tracks and Delmar for unloading purposes. The switch at Roeller tract the property owners are going to put in. I don't know when; whenever we want to get the dirt, I presume. They have agreed to put it in and furnish the switch there into the property. Those cars in moving that earth would have to be switched over the Terminal, loaded on the Terminal and switched from the Terminal onto the Wabash, and then at Delmar they [fol. 786] would have to be unloaded from a switch track there; I haven't figured those items of cost at all.

We did some work on the De Mun tract north of Hi Pointe last year, where we are working now for the Paul Jones Realty Company; they call it the Wydown Terrace. That was simply leveling work.

This new channel for the River des Peres that we dug at where it crosses the Rock Island tracks is nearly half a mile west of where the Wabash tracks cross De Baliviere. I think we did that work

in May and June; that was about the first thing that had to be done on that job.

Q. You stated that you found a certain amount of moisture in the earth that you excavated there?

A. Yes; you will find that any time when you get down six or eight feet in clay around St. Louis.

Q. You find that subsurface water, don't you?

A. No; no water. The further down you go the damper your clay gets, but there is no water in it. I should judge we dug the new channel for the River des Peres about five to eight feet below the natural level of the ground. The embankments were thrown up from the earth that was excavated. It was excavated below the natural level there. If you go down far enough you would hit rock. You couldn't call it wet dirt; it was damp, of course.

Q. My question was, the further down you go, the damper it was?

A. That is natural. Down to rock I think it is three or four feet. There was a sewer put through the center of the channel of the River des Peres possibly ten or twelve years ago, and they encountered rock in that. I presume the rock is solid.

[fol. 787] Q. Then, if the depression of the tracks is made according to the City's plan, according to your experience there and testimony, it would have to be made through rock?

A. Oh, no. We went down five to eight feet with our excavation and were within three to five feet of the rock. I saw the rock there.

Q. So, then, if the excavation were made eight to twelve or thirteen feet below the natural surface there, you would encounter rock; that is what you are testifying to, isn't it?

A. I should judge the River des Peres channel was about fifteen feet below the Wabash right of way and five or six feet below that you strike rock, so that is twenty or twenty-one feet below before you get into the rock. I know that that whole territory south of Delmar and east of the Wabash tracks at that time was low, flat land. I never saw any persons hunting ducks and snipe in that section there.

Mr. Bowen:

Q. In answer to Mr. Hall's question as to whether or not the Wabash ran on a fill from Delmar to Waterman, he asked if it didn't run on a fill of six or seven feet deep; as a matter of fact, wasn't that fill as deep as that only in two individual spots between Delmar and Waterman?

A. I just couldn't exactly say; I don't recall that at the present time. There was, I presume, about 200 or 300 feet from Delmar a trestle, an opening in their tracks, and I think that was six or seven feet, because we used that to drive under there with teams. That was the deepest point. For the majority of the distance I think the tracks may have been very much closer to the natural level of the ground than six or seven feet; I think they ranged to Waterman avenue and Kingsbury.

[fol. 788] Q. Immediately adjacent to the Wabash tracks and east of them wasn't that good looking solid land on which the men engaged in this grading work camped during the construction?

A. There were campers in there when the Catlin tract was graded; that was east of the Wabash, and it was good soil; there was no water there and no possible chance for any water to light there at all. The campers lived further down at Kingsbury or right at the edge of the cut there.

Mr. Brown:

Q. The campers at that time were way up near Hamilton avenue, weren't they? The campers you were telling about?

A. No; they were down just about where Kingsbury crosses the Wabash.

Q. That is Hamilton, isn't it? Hamilton avenue is a continuation of Kingsbury there, isn't it?

A. It swings around there, certainly. The natural channel of the River des Peres spread all over that bottom on the west of the railroad; it circled all around, it didn't spread all over there; it came around in this way—I can't explain now how it run without reference to a plat. I did not make that plat. I was there and did the work. I saw where the River des Peres was running before I commenced to make a new channel for it. It ran almost due south for half of the distance from the point south of Delmar. We changed the channel.

Q. Where did it run with reference to the present channel, that new channel that you made for it; did it run west of the new channel?

A. Some localities on the west and some on the east.

[fol. 789] Q. What portion of the old channel was east and what portion was west?

A. That portion close to Delmar was on the west and the portion further down was on the east. I have done work for the City; last spring I worked on Devonshire, South St. Louis; that was street excavating work. I got somewhere around 60c. a yard. That was just grading for later street improvements. That is the last work I did directly for the City. I have no contracts for work for the City now.

L. R. BOWEN resumes.

Cross-examination by Mr. Brown:

I have with me the plan that shows our work through Forest Park; it is Exhibit No. 35; this plastic model is City's Exhibit 99.

We have placed in evidence as City's Exhibit No. 40 the tripartite agreement between the St. Louis, Kansas City and Northern Railway Company, the St. Louis County Railroad Company and the City of St. Louis.

Q. That is the agreement under which the present line of the Wabash Railroad was laid out and constructed, is it not?

A. I understand it was. That agreement also provides for the present right of way of the Wabash through the park.

There is no question made or raised by the City at this time that the present Wabash Railway Company is the successor of the St. Louis, Kansas City and Northern Railway Company and the St. Louis County Railroad Company under that agreement. That agreement [fol. 790] was dated August, 1875, and the railroad was completed some time in 1876. So far as I know it has been in constant operation since that time. It is a double-tracked railroad through there.

Q. You propose, as indicated on your Exhibit No. 35, to take up that railroad through the park and set it over to the south some distance, and you begin the change at a point near Kingshighway, the eastern boundary of the park, do you not?

A. Yes, sir. We propose to relocate the railroad from that point throughout the entire distance, leaving the park at the intersection of Lindell and Union avenues. Our reason for striking the intersection of Lindell and Union was to get one bridge in place of two bridges; also, by reason of the necessity of raising the intersection of Lindell and Union, it was desired to get that raise as far away from the improvements existing north along the north side of Lindell and Park road as possible, so as to reduce the damages to those buildings and consequently the cost of carrying out this project; also the unsightliness that such a raise adjacent to those buildings would make. The reason for changing the alignment through Forest Park was to carry out more economically and effectively the plan of depressing the tracks through the park and throwing up embankments on both sides of the railroad that would screen the railroad from view and make possible a better landscaping treatment of the right of way through there and to make possible also the bringing to the park of streets from east, which are now absolutely precluded by the height [fol. 791] of the railroad tracks between Lindell boulevard on the north and the Wabash tracks on the south.

Q. Would it be fair to say that from the intersection of Lindell and Union, your proposed change there is primarily for park improvement purposes?

A. It wouldn't be fair to say that, because it becomes almost necessary to do that in providing an economical method of grade separation.

Q. From an engineering standpoint there could not be a practical grade separation project by the depression plan which would continue the location of the railroad on its present right of way?

A. Oh, yes; it could be done very practically, but at very much increased cost. The screening of embankments and of all the other things we are trying to work out through the park south of Lindell could be carried out just as practically on the present route, but at materially increased cost. The primary object of screening the embankments is the reduction of cost. The reduction in cost isn't brought about by screening the cut, but it is brought about by the change of alignment of the railroad.

Q. You mean by that, that the present embankment on which the

railroad is located would have to be excavated as well as the excavation below the ground surface, is that the idea?

A. Yes; although the amount of excavation below the ground surface is relatively small. Its depression below the original surface of the ground would be about the same in either case. The excess cost of carrying out the depression and leaving the railroad at its present right of way is first, the removal of present embankment; second, the [fol. 792] construction of two bridges, one at Lindell and one at Union; third, the increased damages that would be entailed in leaving the railroad in its present location. As to Lindell and Union intersection, there is no engineering difficulty of deflecting the present line to intercept Lindell and Union at the same points shown by our plan, so that that purpose could be accomplished and leave the railroad on its present right of way in the park, except as to the point near Lindell.

The major portion of present embankment is left there under the City's plan and forms a part of one of the side embankments that are thrown up to screen the railroads; its height, however, is reduced.

It is very generally understood, I believe, that a railroad placed on a fresh embankment is not anywhere near as good as a railroad that has been on an embankment and has settled for a long period of years.

The City has no purpose to divest the Wabash of any rights that it now has in Forest Park. In presenting a practical plan, we didn't need to go into the legal phase of how it would be given new rights or divested of old rights, we assumed that in any method of carrying out this grade separation it will be necessary for the City to pass ordinances authorizing the City's portion of the work, and it is natural for us in making our plans to assume that the City would give you a new right of way in lieu of the existing right of way.

Q. Suppose that swap would not be acceptable; the Wabash owns its present right of way and prefers to stay where it is? What I am getting at is what is the City's plan to divest the Wabash [fol. 793] Railroad of its right of way and what means are proposed to compensate it for the property which the City proposes to take?

A. The Wabash would be compensated for the property the City proposes to take, speaking only of its right of way, by giving it another right of way, and I assume if this Commission orders the Wabash to depress the tracks at the intersection of Lindell and Union and the Wabash Railway feels that that obligation is legal and binding, it would endeavor to do the practical thing and the economical thing and move its right of way to the location indicated on the City's plan, rather than insist on carrying out that depression at a very much greater cost on its present right of way. When you trade your right of way for another without additional cost, I don't see that you give up anything. Whether it would be a good or bad trade you would own a right of way in the end in either event.

Q. Your plan proposes that we will give up our present right of way for your proposed new right of way without additional compensation, is that it?

A. The plan proposed that, yes. The proposed new right of way excepting at the point where it diverges for the intersection of Lindell and Union is about fifty feet from present right of way. The Wabash, in its passage through the park, is at distances from the River des Peres varying from about 1,000 feet at its nearest point near Lindell and Union to about I should say, 1,500 feet midway between Grand drive and Kingshighway; at Grand drive its distance from the River des Peres seems to be about 1,500 feet. [fol. 794] The river has a winding channel. The ground between the railroad and the River des Peres slopes down to the River des Peres. Various parts of Forest Park adjacent to the River des Peres has been flooded at different times; at the great flood of August, 1915, the greatest height of water in Forest Park east of Union was elevation 55; the elevation at Union at the intersection of Lindell is 62½, so the water was up within seven and one-half feet of the intersection of Lindell and Union. At Grand drive the elevation of the drive under the Wabash tracks is about 55.

Q. My personal recollection is that in the 1915 flood the water was right at the crossing of the railroad and Lindell drive; do your figures verify that?

A. At Grand drive, you mean? Yes; exactly. At the present location, where it crosses Grand drive the proposed elevation of the Wabash track is about two and one-half feet higher than at present location of Grand drive at that point. That is due to the change in the park, the plan there, the reconstruction of Grand drive; it isn't due, or has no connection with the reconstruction of Grand drive; I mean to state that the proposed grades of the Wabash Railroad at that particular point are that high above present grade of Grand drive.

Q. Is there any danger to the proposed new railroad from overflow water from the River des Peres in the park?

A. Absolutely none; first, there is an embankment twelve feet high thrown up along the south side of the railroad all the way from a point very near Union avenue, to a point very near Kingshighway boulevard on each side of the track.

[fol. 795] Our proposed plan through the park requires a reconstruction of Grand drive; I don't recall any other park work except the reconstruction of Grand drive. This is made necessary by the proposed depression of the tracks through Forest Park.

Every item of cost for the entire work from Kingshighway to Etzel in St. Louis County is included in the City's estimate. The reconstruction of Grand drive is included; every detail is shown in the City's estimate.

The reconstruction of Grand drive is the change of what is now an under crossing to an overhead crossing in connection with the separation of grades. That is strictly a grade separation work in Forest Park.

When we get down to Lindell and Union intersection, our plan

contemplates relocating the Wabash and Rock Island Railroads to the west on what is now private property.

The estimates of the cost of private property to be acquired was made and offered in evidence by Theodore Hemmelmann; I might say that since the time he made his estimate the City secured options on all of that private property necessary and proposes shortly to acquire the property and the prices at which the City can secure the property and the prices mentioned in the option are fifty-eight hundred and some odd dollars less than the estimate submitted by Mr. Hemmelmann; that is for property immediately north of Lindell and west of Union, where we cut off that triangle there. The City does not propose to donate that property for the new right of way, the City proposes that whatever the cost of that [fol. 796] right of way is to the City, will be accepted as part of the City's payment for the carrying out of this improvement. We propose to put it in at cost price.

The Rock Island owns a right of way 40 feet wide from Union to De Baliviere. The Wabash has a track on that right of way. The City's plan for the Rock Island Railroad as has been mentioned in this case, is to have the Rock Island Railroad run over the Wabash tracks from Union to Page and then build a connection from that point to the Terminal West Belt and carry its passenger trains out the Terminal West Belt to the connection with the Rock Island main line at Elmwood Park, in St. Louis County.

The City has carried on negotiations with the Rock Island Railroad Company, looking to that end, and there has been offered in evidence a letter from the chief engineer of the Rock Island stating that this company had decided, if certain conditions could be brought about, to make that change; and all of our negotiations with the different officials of that company led us to believe that that change might shortly be brought about, and it was with that idea in view that we prepared these plans.

I don't know what consultation the Rock Island has had with the Wabash; we have only had their assurance that those consultations would be carried out.

Q. Does your plan contemplate any compensation to the Wabash for permitting some other railroad to use its line?

A. The arrangements one railroad would make with another for such joint use could not properly be put into our plan. [fol. 797] Our plan shows three tracks from De Baliviere avenue to Union avenue, and I note that the plans submitted for track elevation in that same district show two tracks.

Q. What has become of the Rock Island Railroad under your plan between Union and De Baliviere?

A. They would run over the same tracks that the Wabash would run over. Our estimate does not carry any amount to pay the Rock Island Railroad for that 40-foot right of way and main track.

The elevation of the tracks through that district it is assumed would be carried out in the most economical manner and that would be by the joint use of both rights of way, which has been assumed in both the City's plan and in the Wabash plan.

Q. Your plan contemplates the abandonment of the Rock Island of that part of its railroad, does it?

A. No, it contemplates the abandonment of the Rock Island right of way west of De Baliviere.

At present the Rock Island runs over a track on the Wabash right of way from De Baliviere to a point about 500 or 600 feet west of Union boulevard, at which point it gets over on to the main line of the Wabash Railroad. The Rock Island 40-foot right of way and the 60-foot Wabash right of way is used jointly under the track depression plan. Our plan shows three tracks. We assume they would be Wabash tracks.

Our whole plans are based on the assumption that the Rock Island would operate over the Wabash between Union boulevard and Page avenue, just as it now operates over the Wabash between De Baliviere easterly.

[fol. 798] I presume the Rock Island will still own the right of way it owns between there and the Wabash will still own the right of way it owns between there. There is no main line of track on the 40-foot right of way; the main line track of the Rock Island today is on the Wabash right of way.

Q. You are mistaken about that, Mr. Bowen; the Rock Island owns that main track that the Wabash operates over on that 40-foot right of way.

A. My recollection is that the only track that is on that Rock Island right of way today is a siding owned by the Wabash Railroad Company and used recently to haul materials for the construction of the apartment houses that were built between Union boulevard and De Baliviere avenue.

Q. In order that the record may be clear we will put the contract in evidence if the City desires it. In order to avoid the crossing of the Wabash and the Rock Island tracks at De Baliviere, a temporary contract was entered into between the Rock Island and the Wabash whereby the Rock Island used the main track of the Wabash eastbound and the Wabash used the main track of the Rock Island on its 40-foot right of way westbound between De Baliviere and Union.

A. This Wabash valuation map shows the track that you speak of on the right of way line between the Rock Island and your line.

Q. I don't think there is any dispute between the Wabash and the Rock Island that that is the Rock Island main track so the only question now is the point I am stressing here is that your plan contemplates the destruction of the Rock Island Railroad, that [fol. 799] part of it between Union and De Baliviere; it is in evidence in this case that the Rock Island has the right under Federal Court decree to use the Wabash rails from the north line of Forest Park into Union Station at St. Louis, but there is nothing in this record that will give the Rock Island the right to use the Wabash Railroad from De Baliviere to Union, is there?

A. Not that I know of.

Q. So that under your plan you have taken a segment right out of the Rock Island between Union and De Baliviere. Your own

plan shows that the three tracks you contemplate there are Wabash, not Rock Island tracks, in your plan between Union and De Baliviere, is there?

A. No, sir. That distance is about 3,500 feet.

Q. The effect of that not only destroys the Rock Island Railroad between Union and De Baliviere, but absolutely destroys its right which it has under the Federal Court decree to operate over the Wabash rails from the northern line of the park into the Union Station at St. Louis, because it can't reach the north line of the part on its own rails, can it, as it has the right to do at present?

A. You understand that the plans we have submitted are not plans for the elimination of the grade crossings on the Rock Island Railroad, but the plans for the elimination of the grade crossings on the Wabash Railroad; if we were submitting plans for eliminating grade crossings on the Rock Island we would make provision for them from Union avenue west. The Rock Islands runs parallel to the Wabash from De Baliviere to Union on the same level; we contemplate separating the grade at both Union and De Baliviere at the Rock Island as well as the Wabash.

[fol. 800] Our estimates of cost were based only on the damages done to private property and the cost of construction necessary to carry out the project.

Q. When you get down to Delmar avenue crossing your plan first contemplated that River des Peres culvert of something like 400 feet in length, wasn't it?

A. About that, sir. We filed one supplemental plan; the original plan for the entire project provided for carrying the culvert to the Kingsbury avenue culvert; the supplemental plan was to carry it to the Waterman avenue culvert; the first thing we filed were plans for Delmar avenue viaduct; after those were filed, we filed plans for the complete project; in the complete project the culvert to be built under the Delmar bridge is shown extended to the Kingsbury bridge; there is no change, whatever, in the plan; that is simply one unit of the plan; in the second unit of the plan a change in the plan was made when we said that in carrying out the entire project, the City would, at its own expense, connect the culvert at Kingsbury and Waterman by an extension to the original culvert; that is one change in the City's plan, not two. In our viaduct plan we propose to carry the culvert approximately 200 feet south of Delmar avenue. It is intended that the culvert shall be there permanently.

Q. This culvert is really one unit in the River des Peres improvement, is it not?

A. No, it is not; the culvert we show in plan for Delmar boulevard is made necessary to support the fill required for raising Delmar boulevard over the Wabash tracks. The extension south to Kingsbury and Kingsbury to Waterman which the City proposes to do at [fol. 801] its own expense, would be an improvement in the channel of the River des Peres.

Q. Isn't the construction of the culvert south of Delmar avenue identically the same as it is where it crosses Delmar avenue?

A. The method of construction is the same; the purpose of the

construction is different; the construction will be approximately the same. There is no difference in the plan for that part that crosses Delmar and that part between Kingsbury and Waterman.

Q. I am interested to know by what process of reasoning you figure that that River des Peres culvert is a part of the grade separation work?

A. In separating the grade crossings of the Wabash tracks at Delmar by the construction of a viaduct over the tracks, it becomes necessary to place fills east and west of the bridge over the tracks to support the streets; in placing this fill west of the tracks we encounter a natural channel of a flowing stream and it is physically impossible to support the fill without finding something to support the filling and therefore a culvert of proper size has been included in the City's plan to support that fill and provide for the uninterrupted flow of that stream in the water course.

You couldn't support the fill on piling. We are not building streets in the City of St. Louis on top of trestles today.

At this point an adjournment was taken until 2 p. m.

L. R. BOWEN resumes.

Mr. Brown:

Q. In your estimate of the cost of the viaduct, you included the [fol. 802] cost of this culvert as a part of the viaduct cost. Is that correct?

A. That is correct.

Q. You included it as a part of the viaduct cost on the assumption that the primary purpose of the culvert is to furnish a bridge for the west approach of the viaduct, isn't it?

A. To furnish a support for the earth fill of the west approach. My reason for including it as part of the viaduct cost is that it furnishes that bridge.

We showed the culvert to be constructed in the only available place that such a culvert could be constructed.

We put the culvert in because it is necessary to support the earth fill required for raising the western approach to the viaduct.

Q. On the other hand if its purpose is to take care of the River des Peres waters, it is essentially a River des Peres improvement, isn't it?

A. It undoubtedly improves conditions there just as the construction of the viaduct also improves conditions there. In my second plan that I filed on the River des Peres culvert, we propose to extend it from a point about 200 feet south of Delmar southwardly to Kingsbury.

We stated that the City of St. Louis would at its own expense extend that culvert from the portion that is built in connection with the Delmar viaduct southwardly to Waterman avenue, in the event that the depression of the Wabash tracks south of Delmar was undertaken in advance of the construction of the River des Peres sewer.

Q. The only difference in the parts of the culvert referred to is

[fol. 803] that the part which crosses Delmar avenue, also serves as a bridge for the west approach of the viaduct, isn't it?

A. I wouldn't say "also", that is the primary purpose there of building it was to support the fill; it also takes care of the River des Peres and improves conditions in the River des Peres; the primary purpose in constructing it from there south is simply and solely to improve conditions in the River des Peres.

Q. Doesn't it equally improve the River des Peres where it crosses Delmar avenue, the same as it does south of Delmar avenue?

A. We haven't so claimed in this suit; we only claimed in constructing the culvert in Delmar, we would make conditions as good as they are today, actually it will make conditions a little better; the construction of it from that point south 1,400 feet to Waterman, will very materially improve flood conditions in the River des Peres.

If the question of grade separation was not present, there wouldn't be the same urgency for the improvement of the River des Peres at Delmar Boulevard to alleviate grade conditions as there is in consideration with grade separation. The only flood condition that exists north of Delmar that I know of is the floor condition that exists at Olive street road, which is absolutely independent of the River des Peres situation at Delmar boulevard.

Q. Is it your judgment that the bridge over the River des Peres on Delmar west of the Wabash tracks is ample to take care of the flood condition?

A. Experience has demonstrated that it has been ample for all except the great flood of August, 1915; if the Delmar project does not go through, the City should rebuild the bridge over the River des Peres, at Delmar Boulevard, not because of any restriction to [fol. 804] the channel, but because the City needs a wider, better bridge there than it has today.

The City plan referred to as the "Horner" plan, for the improvement of the River des Peres, begins at the city limits on the north; it is quite a distance northwest of the point where the river crosses Delmar avenue. Under the City's plan for the improvement it is deemed necessary to take care of the River des Peres north of Delmar to the city limits; that is essential to the River des Peres scheme.

Q. This culvert across Delmar avenue, is to become a part of the completed scheme of the City of the River des Peres' improvement, isn't it?

A. If it is built in advance of the River des Peres improvement, the City will naturally take advantage of it in constructing the sewer at that point just as it has done in numerous other instances where sewers have been built under culverts, and it happened only this year under the Terminal tracks near Goodfellow avenue. The City will utilize this section from Delmar south to Waterman, as a part of the permanent improvement of the river.

Q. During your examination this morning you stated that the railroad company's plans for elevation of tracks between De Baliviere and Union, contemplated only three tracks. I find on examination, that the Wabash plan for the elevation of tracks on its right of way,

provides for three tracks and that the Rock Island plan provides for an elevation on its 40 foot right of way of 1 track, so that under the combined Wabash and Rock Island plans the full property width of the right of way is utilized and the integrity of the railroad lines [fol. 805] maintained between those two points.

A. If your examination has disclosed that, you have undoubtedly been looking at drawings other than those filed before the Commission, because the plans furnished the City showed only one cross section between Union and De Baliviere and on that cross section I am very positive only two tracks are shown; that is the Wabash cross section.

We have here the plan; it is a matter of observation as to whether the plan shows 2 or 3 tracks; this is in the record; this is Wabash Exhibit No. 34.

On the Wabash plan which I have before me, there is a section entitled "Typical Section, Union boulevard to De Baliviere"; on this section is shown a 60 foot right of way marked "Wabash Railway," and a 40 foot right of way marked "Rock Island Railway," making a total width of 100 feet; exactly in the middle of the combined right of way is shown an embankment; on this embankment is shown two tracks thirteen foot centers, that is the only plan I have seen that has been submitted in this case.

The tracks are thirteen foot centers; they are placed exactly in the center of the 100 foot right of way; that makes the center line of the outside Wabash track 56½ feet from the south line of the Wabash right of way or 3½ feet from the north line of the Wabash right of way and the standard width of tracks is 4 feet, 8½ inches; that makes the outmost rail 1 foot, 1¾ inches on the Wabash right of way, which of course, would be insufficient to allow any clearance for the passing of any trains.

[fol. 806] Q. However, the tracks may be laid on the blue print, there will be no right in the Wabash to encroach on the Rock Island right of way, would there?

A. Not that I know of. I don't recall any conference with our legal department or conferences with the legal officers as to what rights the City may have to convey a good title to the Wabash Railroad for that right of way through the park. I am familiar with the acquisition of Forest Park. The land was acquired by the Commissioners of Forest Park through an act of the State Legislature creating such commissioners, and they were empowered to either condemn the land necessary or to acquire the fee to the land and to pay for the land out of bonds of the County of St. Louis; part of the lands they did acquire in fee. The City acquired title to the park the year following the acquisition of the park by annexing the land including the park and assuming the entire debt of St. Louis County.

Q. In your estimate of what has been referred to as the Tamm avenue sewer, which cost \$380,000.00,—something like that—does your estimate include the cost of acquiring the land for that sewer as it runs through the park and down public streets? How is that?

A. It runs through the park and down public streets altogether.

Q. Our engineers have prepared some memoranda here which

seem to be entirely engineering matters that go to the question of some of your estimates. Your Exhibit 97, which I believe is an estimate of total costs, you stand upon the correctness of that so far as the City is concerned?

A. With this exception, that in looking over these estimates after [fol. 807] their submission, we found, I think it is two items that were omitted by the contractors employed to estimate this work; one of those was the sodding of the railway slopes which was shown on City plan and omitted in the estimate of the Woermann Construction Company; one of those was the omission of the cost of modifying the United Railways' trestle at De Baliv-ere avenue, to permit a temporary track to pass through; another was that the contractor who estimated the cost of the railroad work made an error in addition which will add \$11,000 to the cost of ballast.

Q. In that estimate you show 5,000 cubic yards of excavation at 85 cents a yard between stations 0 and 30, that is the section from Kingshighway to a point about 800 feet east of Union, using this excavated material in building embankment screens, now between station 30 and station 110, which is at Delmar, your estimate calls for 280,000 cubic yards at 95 cents, and you provide for using part of this excavated material in the bridge approaches and part of it in making the railroad embankment between Delmar and Etzel and wasting the remainder; total cost of grading, \$321,200 made up as follows: 56,000 cubic yards at 85 cents, \$47,600; 280,000 yards at 95 cents, \$266,000; 4,000 yards at 65 cents, \$2,600; 5,000 yards at \$1.00, \$5,000; now the 280,000 cubic yards which constitutes the bulk of the excavation is hauled a much longer distance than the 56,000 cubic yards, and yet you add only 10 cents to your estimate, that is from 85 cents to 95 cents; our engineers want an explanation of that?

A. These estimates you understand were prepared by Mr. Pollock, who is the engineer for the List & Gifford Construction Company, [fol. 808] the largest railroad contractor, I believe, in the City of St. Louis; he prepared the estimates of cost of that grading and testified before this Commission and was cross-examined by you, I think.

Q. Attention is also called to the fact that in your estimate no provision is made for temporary trestles to carry the Wabash tracks over Olive street road, Maple avenue, and Bartmer avenue, during construction? Is that correct?

A. Yes. I hadn't quite finished answering your first question, but we can discuss that. The engineer of the List & Gifford Construction Company states in his report, I believe, that he proposed to raise the tracks in there without the construction of trestles by raising them largely under traffic; the explanation as I understand, was to keep one of the main lines under traffic and raise the other track as far as it could be raised, putting under a cinder ballast on the track, then transferring traffic over to the raised track; in other words, at Olive street road the Wabash has today but two tracks; the location of Olive street road is changed from present location; there is a sufficient width of right of way at that point to spread the tracks so that one track could be raised a very considerable distance

both sides of the new bridge; I neglected to state the tracks can be shifted sufficiently so that the bridge can be built at Olive street road in advance of the grading.

Q. Does your plan contemplate closing Olive street road, Maple and Bartmer avenues, during the construction period and afterwards excavating the embankment out again to open the streets?

A. At Bartmer the total height of fill is only a few feet and the [fol. 809] street is raised up to pass over the track and the street would be raised just as the tracks are raised; at Olive street road we figured a bridge would be built in advance of the construction of the tracks and one of the tracks would be operated at existing grade of Olive street road while the other track was being raised up to pass over the bridge; we figured it would be necessary to close either Olive street road or Maple avenue at alternate times, Olive street road and Maple avenue joining together a very short distance west of the Wabash tracks, so that the closing of either street would work no hardship whatever on traffic. These bridges are included in our estimate. Those are permanent bridges.

Q. In your Exhibit 90, the summary sheet at second page, shows cost of grading \$321,000, and immediately below you show grading inside City limits is \$318,380, a difference of \$3,000; it is pointed out that further down the list you show outside grading at \$30,000. This makes an excess of \$21,000 more than there should be; the point is your net balance of \$291,200 should be increased \$27,000; as shown by your exhibit 97. Apparently there is an error of \$27,000 where you show net result of \$297,000. I assume it is a typographical error of putting down \$30,000 instead of \$3,000, but apparently the error has been carried into your Exhibit 97 and your net result shown in Exhibit 97 of \$291,200 should be increased \$27,000.

A. I will look that up and testify a little later on that.

Q. In your Exhibit 90, you contemplate that in relaying the track in the cut you utilize 60 per cent of the old ties and 50 per cent of the old spikes, as an engineer, would you construct a new line of [fol. 810] railroad for heavy traffic by utilizing old ties?

A. I am not a railroad engineer and we didn't feel that we were qualified to furnish an estimate on such items and therefore employed Mr. Pollock, of the List & Gifford Construction Company, to do so; I know this; that in the cost of separating grade crossings in other cities, the cost of putting down entire new set of ties is not charged to the grade crossing work because the Commissions have usually considered that a certain percentage of the life of those ties was gone, and that the railroad was not entitled to have an entire new set of ties, rails, etc., when it didn't have that before the grade was changed. I don't know a thing about the question of whether 60 per cent or 10 per cent is salvage. That would be problematical and depending on the man who made the estimate. I should imagine that ties that have been in ballast for a number of years when taken out and exposed to the elements would disintegrate very rapidly.

Q. In Item 4, your Exhibit 90, covers laying temporary track in

an alley between Union and De Baliviere and you state the amount to be \$21,850; that alley does not extend entirely down to De Baliviere, does it?

A. No, there was a distance between the end of the alley and De Baliviere over which the alley did not extend; it is exactly 150 feet; at that point it turns north and extends north from that point. That alley has not been paved along here; the alley has been paved a very considerable distance east of here at the rear of the apartments along Pershing avenue. There are one or two garages there, all of which we have investigated and find that all of them have access [fol. 811] to the street in front, so that the placing of the railroad along the south part of the alley would not seriously inconvenience the owners. On the 150 feet immediately east of De Baliviere, there has been constructed since this proceeding, a large public garage that is located in this alley strip if extended to De Baliviere. That will make necessary the moving of temporary track at that point southwardly onto the railroad right of way; what we proposed to place along there was the temporary track during construction, and I have here at this time a plat showing the situation you mention and showing that that track can be switched back onto the railroad right of way; the combined right of way there is 100 feet wide; it affords ample room to carry the temporary track and to afford room for the excavation of the two tracks before interfering with this temporary track. This matter has been gone over with the engineer who prepared this estimate and he states that it would not in any way affect the unit cost to which he has testified. I would like to introduce this in evidence at this time as it shows the method of grading and of carrying that track at this particular point on the railroad right of way.

Said exhibit is marked "City's Exhibit 134."

Q. Do you put it on the trestle or on the surface?

A. On the surface; take it off after the excavation is completed; that track is a temporary one put there to carry traffic during the making of the excavation and the laying of permanent track, after which it is diverted to the excavation and this is taken up and disposed of.

Q. In regard to the temporary track that is constructed down the [fol. 812] alley, and the method you propose to avoid private property, attention is called to the fact that you made no provision for taking up the temporary track and removing it?

A. I don't know whether Mr. Pollock figures taking up and removing temporary track; if not, he figured the salvage from the track would pay for its taking up and removal.

Q. In Exhibit 90, the estimate does not provide for any track work north of Delmar, but in the summary the amount of \$5,000 is given for extra track work, and this sum is subtracted from the total in order to show corresponding lesser amount for cost inside City limits?

A. Sixteen hundred feet of track, \$5,000. I would like time to study that. I am not familiar with the exact details of the estimate Mr. Pollock made. I would advise you on that later.

Q. Attention is also called to the fact that your estimate fails to provide any estimate for taking care of the two main tracks and the two sidetracks north of Delmar while the roadbed is being raised. Can you explain the method by which that work is to be done under your estimate?

A. I will make note of that and study this estimate of Mr. Pollock's and see if I find an item in there that takes care of that.

I spoke of \$11,000 error that I discovered; that error is in items F 1, 2, 3 and 4 of our Exhibit 90. Estimate 90, unfortunately, does not provide entirely for cinder ballast but is based on a very much more expensive ballast.

The part north of Delmar, both in the City's estimate, and the Railroad Company's, is figured on cinder ballast; that is on the assumption that present ballast is cinders.

Q. I am advised that the ballast there is burnt clay, surfaced with cinders.

A. If burnt clay is under the ballast, it is not in evidence. I have [fol. 813] seen the ballast; the tracks in there were ballasted with cinders; we have not made any deep excavations to find what kind of ballast is down 4 or 5 feet under the ground, but the 12 to 14 inches under the tracks so far as we can find out is a cinder ballast.

Q. The Interstate Commerce Commission's inventory shows that it is burnt clay ballast with 6 inches of cinder dressing on top. Now, burnt clay ballast is as expensive to reproduce as washed gravel or rock, isn't it?

A. I don't know anything about the cost of burnt clay ballast. I haven't seen it used for a long time.

I testified to some test wells or holes made in the neighborhood of De Baliviere to determine the sub-surface waters. It is not true that in sinking one of those wells an artesian flow of water was encountered. There was no artificial flow found in any of the wells; the test pits sunk near Lindell and Union were sunk as we stated about 5 feet deeper than the tracks and stood exposed from the 25th of September, 1916, until the 13th day of November, that year, and during that time there seeped into the test pit a total of 33 inches of water; in other words, it did not get within 2 feet of the proposed grade of track at that point proposed by the City of St. Louis; at De Baliviere, where the cut is the deepest for depressing the Wabash tracks, a pit was sunk 23 feet deep or 5 feet deeper than it is proposed to depress the tracks at that point; that pit stood there from September 29, to November 13, 1916, and during that time the total amount of seepage water that came into that pit was 79 inches of water at De Baliviere, which was about 19 inches above proposed [fol. 814] grade of the Wabash tracks at that point, but it took from September 29, 1916, until November 1, 1916, 34 days, to collect 60 inches of water, corresponding to the height of the Wabash tracks at that point. During that time there was more than 5 inches of rainfall; the average rate at which the water raised in the pit was about 1.8 inches a day, which would correspond, I think, to something like a quart an hour into a hole having a total area of about 24½ feet; what you are endeavoring to bring out with reference to an

artesian well was that; and you have no records on it except the statement I made to your chief engineer.

We made borings to locate the depth of rock at all of the points where bridges are proposed and the character of the soil; we have a boring apparatus that brings up 2 inches of soil and we made borings all through here and found this the finest kind of hard clay. They began these borings near Grand drive and proceeded down to De Baliviere avenue; when they passed Union, in place of putting the testing apparatus in the hole, they put it alongside the hole and that made an expense of 18 feet to go through the soil and we had finished the test at De Baliviere and I told them to test this hole from the bottom of the pit to save digging. In carrying this test pit a pipe is put around the auger near the surface of the ground where the ground is soft, to protect it from caving in the hole, and such a pipe was placed in this pit through the 79 inches of water; just as they struck rock and pulled out their auger, the men told me, I didn't see it, a flow of water came up through this pipe and flowed out the top of it and flowed a pretty good stream of water into the hole. I reported that to your chief engineer.

[fol. 815] The water raised quite a bit, I have no record as to just what height it raised; that is not an unusual occurrence where a hard, impervious clay overlays the rock.

In most all of our bridges in St. Louis we have found it more economical to sink shafts of concrete to rock than to drive piles and we find that situation very frequently when we pass through a good character of clay just before we strike the rock, we find a stratum of water that will rise up in the pits quite a distance.

Q. On page 211, of the transcript of the record you testify as to clearances, contending that 18 foot clearance is ample and in the course of your testimony state you had been observing the operation of trains there and never observed anybody riding on top of cars; I think you suggested that in this proceeding we might secure an order from the Commission prohibiting a man from riding on top of the cars in order to utilize and 18 foot clearance; I wonder if you have had in mind the provision of Section 1047, of the Revised Code of the City of St. Louis, which makes it unlawful for the railroad company to operate cars within the City without having a man on top of the cars?

A. I didn't know there was such an ordinance; if there is such an ordinance your company has violated it a great number of times.

Let me make the position of the City of St. Louis clear on clearance; the City of St. Louis has done mere to give adequate clearances than all of the railroads in St. Louis put together.

Q. On the Twelfth street viaduct and Jefferson avenue viaduct [fol. 816] they formerly had less than 22 feet, and when they were rebuilt they were given 22 foot clearances?

A. That is correct.

Q. The same is true of the Merchants' bridge and the Free bridge and the Eighteenth street viaduct and the Grand avenue viaduct and the Chouteau avenue viaduct and at Vandeventer.

A. I don't know anything about the Merchants' Bridge being rebuilt; they have more than 22 foot clearances.

The new Union avenue viaduct over the Terminal tracks was to have a clearance of 20 feet, built by the Terminal Railroad, not by the City of St. Louis.

We know it is unsafe for a man to ride on top of a freight train with any clearance less than 22 feet and we have been aiming and the City of St. Louis has spent a good deal of its own money to give 22 foot clearances under the bridges over the tracks in the Mill Creek Valley; in the Mill Creek Valley there are a great number of railroad tracks located close together; I know that at Twelfth street there are more than forty tracks from north to south and it is unsafe for a man to signal in switching in that district from the ground, much more unsafe than it is for a man to signal from the top of the cars; in that district there should be a 22 foot clearance. In New York City the riding on top of the cars is prohibited.

At Delmar and at Kingsbury and at Waterman and at De Baliviere and Union and at Grand drive in Forest Park, where we propose bridges with 18 foot clearances, there are no industries and in my judgment there is no chance of industries ever being in that district.

All the switching in there is north of Delmar boulevard and where [fol. 817] the switching is to be done and where industries are to be operated, the City's plan proposes track elevation.

Q. If the Commission should require 22 foot clearance for your proposed Delmar viaduct, that would throw all of your estimates of cost out of line, wouldn't it?

A. It would not only throw our estimates of cost out of line, it would lose to the City's plan practically all of the advantages that are claimed for it.

Q. In your estimate you make no provision for taking care of traffic on Delmar during the construction period; is it your purpose to close Delmar while that viaduct is being constructed?

A. Our method of operating at Delmar is this: We have taken up with the engineer of the United Railways Company, the method of handling their cars during the construction of that bridge, and the plan we have worked out together is this: In connection with the dirt that that company is to furnish for the raising of that street, it is to build a temporary trestle or bridge over your tracks at the north side of Delmar and to immediately, just as soon as this work is ordered, separate the grade crossing as far as the United Railways' tracks are concerned, and to carry its cars during the construction of that bridge overhead, over your tracks so that there would not be any interruption of traffic on the street car line; that bridge would be built with steep approaches at first, most of those approaches would be made with the fill that it will bring in and will be widened out as the work proceeds until they can lay their two tracks across the completed structure. So far as the vehicular traffic is concerned, [fol. 818] it will have to detour over Kingsbury avenue. Kingsbury avenue lies about 1,000 feet south of Delmar. There is nothing in our estimate covering this temporary work I have described. That work would be paid for by the United Railways Company. They find that the cheapest way to handle their traffic during construction. That method has been worked out between the City and the United Railways Company in other construction projects.

We did exactly the same in the tracks we depressed at Tower Grove; we furnished the United Railways with the plan of a bridge and we loaned the United railways such of our steel beams as we had in stock that assisted it in its purpose, and it paid its own cost as it would do here.

Q. In your viaduct plan for Delmar you insist upon an approach grade of 2½ per cent, I believe?

A. That is our plan. At Bartmer we have stated that is only a temporary proposition; after we pass the city limits we propose that the railroad tracks shall come down as soon as possible to get back to original grade, and in doing that they pass Bartmer at a height above the height of present crossing, we propose there would be temporary run-offs of the street until such time as the Wabash shall separate it by elevating, if the Wabash cares to do that. At the present they will have available for that purpose some 240,000 yards of excess excavation.

I have not estimated the cost of permanent improvement of Bartmer avenue.

Q. If the work is completed under your depression plan, the edge of the cut will extend very close to the line of alleys on both sides of the Wabash right of way from De Baliviere avenue?

A. Yes, sir.

[fol. 819] Q. Will those alleys be utilized and what protection would you provide there for keeping travelers in the alleyway from getting into the cut?

A. We have not made any such provision; when the alley is paved, it is probable that a curb would be constructed along the railroad side; no provision exists there today for preventing vehicles from running off that same alley into your present railroad cut.

In the improvement in order to make it secure as a permanent thing a deep curbing should be provided; I think, however, it is properly chargeable to the construction of the alley and it is so shown on our plan.

I have investigated the garages along those two alleys. It has been some months since I investigated the alleys, probably a year; I don't recall the exact conditions at any one of those places.

Q. Our investigations shows a great number of the garages along there to which the only means of ingress and egress is by these alleys. What would you do in that situation?

A. In that case the owners would have to submit to the inconvenience just as they would if the alley was paved. I propose to close the alleys during construction period. Our experience has shown that the owners have had to do it in the past.

I know Mr. Charles S. Butts, an engineer in the Department of Public Utilities. I don't know what study he has given to the question of subways and elevated structures. I see press articles every once in a while for this, that or the other, but I don't know what time he has been giving.

Q. He is an eminent engineer, isn't he?

A. That I don't know. I am not familiar with the contents of

[fol. 820] a paper he read before the Associated Engineers' Society on September 21st, of last year.

Q. Would you attach any particular importance or faith in any statements he made as a result of his studies of elevated structures and subways in cities?

A. That would depend entirely upon how those statements corresponded with my own observations of the same thing.

Q. The City's position is that the elevated structure within the city limits along there would be a very shocking thing, isn't that correct?

A. An elevated structure there would undoubtedly be very disastrous to the City of St. Louis.

Mr. Brown reads excerpts from Mr. Butts' paper, as follows:

"It is proposed to establish an elevated and subway line over the following route: beginning at Hodiament avenue and Maple avenue, thence following old Suburban right of way to Vandeventer avenue, thence in a subway into the City. This line now operates on a private right of way and could easily be elevated by the construction of reinforced concrete walls and filled in, thus eliminating the noise subject to a steel structure. The elevation of this line would dispense with twenty-one dangerous grade crossings. This line should start to elevate at Maple avenue, go over or under all streets and alleys, crossing along present right of way, crossing Vandeventer avenue to a private right of way on the north side of Morgan street (now Von Verson avenue) and coming to the ground about Spring avenue. From this point it would continue as a subway under Franklin avenue, eastwardly to Easton avenue, thence [fol. 821] southeastwardly under the proposed extension of Easton avenue, to Morgan street, thence eastwardly under Morgan street (which is to be widened) to Sixth street, thence into a loop under Union Market, bounded by Lucas avenue, Morgan street, Sixth street, and Broadway, using a part of same for a station. The distance to be elevated from Maple to Spring is about three and one-half miles; the length of subway from Spring to the new station at Broadway and Lucas is two and one-half miles. The old Suburban right of way is the natural route for an elevated railroad west of Vandeventer. The class of elevated structure proposed would not be in any way objectionable, as it would run in the rear of all property and could be constructed with concrete walls and filled. This would not create any more noise than present system and could be kept in better repair than at present, as the surface street and alley crossings would be eliminated. The elevation of three and one-half miles of this six-mile system would be better than a subway as it would operate in the open air." I want you to catch this next sentence particularly: "It would be impossible and objectionable to construct an elevated railroad over any street or alley in any other part of the West End."

Now, Mr. Bowen, you are familiar with the neighborhood out there and will concede, will you not, that from Maple avenue, eastwardly at least to Taylor, that that Suburban right of way extends

through a high class residential district. I mean the Suburban street car?

A. Yes, sir.

Mr. Bartholomew is not a City beauty specialist; he is the Engineer [fol. 822] of the City Planning Commission; he testified in this case in regard to the propriety of elevating or depressing tracks.

I have not examined his report on "City Beautiful Plan of the City of Hamilton, Ohio"; it has not been brought to my attention. I have never been at Hamilton, Ohio.

Q. This report indicates that through the residential and park districts of Hamilton, Ohio, he proposes under the City Beautiful Plan, that both the Pennsylvania and Baltimore & Ohio Railroad tracks shall be elevated in order that the grade crossings may be separated.

A. Since you have drawn that to my attention it might be stated that in advocating grade separation through Forest Park, Union boulevard, Lindell boulevard, does not necessarily mean that we advocate track depression at every place in the United States; I don't know what the conditions at that place in Ohio are; topographical conditions may make it absolutely impossible to do anything but elevate the tracks and under those conditions no engineer could do otherwise than recommend track elevations for separation of grades.

I have not examined the report made September 30, 1920, to the Honorable Board of Public Works, of the City of St. Louis, in regard to the transit system.

Mr. Brown: We will file it; this is entitled, "The Saint Louis Transit System, Present and Future, City Plan Commission, 1920." I note for the record the following paragraph taken from page 32:

"The above estimates are for subway construction in the eastern downtown district out to respectively Grand and Gravois, Vandeventer and Chouteau avenues, Vandeventer and Hodiamont [fol. 823] right of way, and Grand and Natural Bridge avenues. From these points the estimates are for concrete elevated structures spanning the surface car tracks, excepting in the Hodiamont right of way, which will be elevated by building two concrete retaining walls and filling in with earth. At the street intersections the elevated structure will be carried over the streets."

"The cost of subway construction is from five and one-half to seven times as great as an elevated structure and will cause a variation in the above figures greater or less as the amount of subway construction is decreased or increased."

Said report is marked, "Wabash, Exhibit 52."

Q. This is the second proceeding, isn't it, Mr. Bowen, brought by the City of St. Louis, involving the grade separation scheme?

A. Yes, sir.

Q. In 1915, the old proceeding was still pending under which

the City was proposing substantially the same grade separation scheme as they are now proposing?

A. I know there was such an action brought about that time. I was a witness in the case.

Mr. Brown: I desire to read this original letter dated March 9, 1915, addressed to Mr. Cunningham, on the letterhead of the Law Department of the City of St. Louis, written by Mr. Charles H. Daues, then Assistant City Counselor of the City of St. Louis, as follows:

"The case of Henry W. Kiel v. Wabash Railway Company, et al., which is a suit to separate certain crossings at grade, will be set before the Public Service Commission of Missouri for hearing in the [fol. 824] near future and at such time as the parties may agree to take the case up. I have deemed it expedient to advise Mr. Kinsey of the Board of Public Service to have our engineers prepare plans and make estimates for the most feasible and practicable separation of these grades so that they may be submitted to the engineers of your company and the engineers of the Public Service Commission of Missouri. This in nowise involves the issue as to whether or not the crossings should be ordered abolished. The engineering features are entirely separate and distinct from the legal questions involved and it would seem best for complainant as well as the railroad companies interested to arrive at some definite understanding as to how the project could be carried out most acceptably.

"I am told by Mr. Kinsey that the diverting of the waters of the River des Peres is involved if a depression scheme is considered. I am also informed that the drainage scheme is an enormous project and for that reason it would probably be best that an overhead plan be alone considered.

"At any rate, all the engineering features it seems, can be best solved if there were a concerted consideration of the plan by the engineers representing the different interests. Accordingly, I write you whether you will not confer with Mr. Kinsey about this matter with a view of reaching some definite conclusion as to what is the proper solution of this separation scheme, looking at it from an engineering standpoint. If you will inform Mr. Kinsey when you are prepared to take this matter up with him, he will be very glad to join you to consider these questions."

C. P. Richardson:

Q. On this blue print entitled, "Proposed method operation, De Baliviere avenue," you show that temporary track on extreme left [fol. 825] side supported on a 1:1 slope, under that you show a finished slope on a 1½:1 slope, drawing a line from the foot of that temporary 1:1 slope on the natural slope of the ground would land considerably inside of the center of that track. I wanted to ask if that was submitted as a practical railroad operating condition and state how long you were going to operate trains on that bank?

A. The use in the first place of a 1:1 slope in a cut for temporary railroad operation during construction of this kind is not at all un-

usual; during work at Tower Grove for a long time, the Missouri Pacific maintained a temporary track of this kind on a slope of one horizontal to six vertical; aside from that in a method of operation here, it is not essential to maintain a slope that steep; the first track put down is near the north side of the right of way and a long way away from the temporary track, sufficient space is available in there to get nearly any slope you would want, but the 1:1 slope shown there is very frequently done for temporary work.

This is for whatever movements the railroad has, which are now largely passenger movements, and it may be mentioned the traffic maintained by the Missouri Pacific at Tower Grove during the construction I have mentioned, was many times in excess of the traffic at this point.

Mr. Bartholomew's City Plan of Hamilton, Ohio, was marked "Wabash Exhibit No. 51."

Mr. Brown asks that Section 1047, of the Municipal Code of the City of St. Louis, 1914, be offered in evidence.

Redirect examination of Mr. Brown deferred.

[fol. 826] JOHN LAWRENCE MAURAN, being duly sworn, testified as follows:

Direct examination by Mr. Senti:

I reside at 45 Vandeventer place, St. Louis, and am an architect of the firm of Mauran, Russell & Crowell, located in the Chemical Building. I am a graduate of the Massachusetts Institute of Technology in 1889; then a year abroad; then two years in the office of Shepard, Rutan & Coolish, architects of Boston; two years with them as Superintendent in Chicago on the Art Institute and the Public Library; at the end of which time I came to St. Louis to represent that firm and later became a St. Louis partner. In 1900 I established the firm of Mauran, Russell & Gardner, which in 1911 became Mauran, Russell & Crowell.

Q. Have you had any connection with the erection of any large buildings in the City of St. Louis?

A. Yes, the Railway Exchange, Butler Bros., not only in St. Louis but in Dallas, Texas; associate architects on the Statler Hotel; architects of the new Bank of Commerce Building; the old St. Louis Union Trust and we are now engaged on plans for the new Federal Reserve.

In 1904 I was delegate to the International Convention of Architects in Madrid, delegate from the United States.

I have been a member of the local Chapter of the American Institute of Architects ever since I have been here, served as secretary and president of the local chapter. Served as treasurer and president of the American Institute of Architects in 1913-15.

[fol. 827] Was Chairman of the Municipal Bond Issue Committee,

which selected the projects which seemed most urgent, the same question which is up today before the City. They acted in an advisory capacity for the City officials as to which projects should be carried out.

Q. Are you familiar with modern practices in cities as to placing of railroad tracks with reference to the surface of the streets?

A. To a certain extent, yes.

I have been very much interested in the subject and in some places it seems absolutely essential on account of conditions that cannot be otherwise overcome, to place tracks overhead, but the tendency seems to be wherever possible to either depress or make it a full underground system; I think the question is best illustrated by reference to two features in Chicago; while they have to put a great many of their tracks overhead on account of the nearness to water level, the appearance of downtown Chicago around the loop is familiar to all, with the gloom and noise and unsightliness of overhead structures and along the water front from the Art Institute south, the whole condition of which I was thoroughly familiar as I lived across the street; prior to the change in the park arrangement the Illinois Central tracks ran on the surface and between the observer on Michigan boulevard and the lake with the railroad yards beyond, were the long lines of freight cars, making a most unpleasing vista from Michigan avenue; today with the simple device of sloping the ground upward and crowning that slope with a railing or ballast rail, the entire railroad yards are obliterated and one sees nothing but a puff [fol. 828] of smoke or steam beyond the railing. That is the most graphic illustration of what is being done wherever possible to put them out of sight.

Q. What would you say as to the possibility of keeping an embankment which supports the line of a railroad in a good condition, that is, an attractive condition by planting and sodding and attentions of that character?

A. It seems to be a difficult thing to do. I call attention to the passage of the Pennsylvania Railroad, which has one of the model rights of way through the Zoo in Philadelphia. In the first place as it passes through the Zoo it is a complete block in the continuity of the perspective; the sides of the embankment are kept as slightly as possible with planting of shrubs and sodding, but nevertheless it is crowned with the track, visible trains passing to and fro, and necessarily the signal systems; there is no getting away from the fact that there is a railroad there.

Q. With respect to Lindell and Union boulevards, what in your opinion would be the effect upon the perspective of the erection of an embankment carrying the railroad over that or a bridge?

A. I don't think it is very hard to visualize what the difference would be; it would be a multiplication of the existing eye-sore; I hesitate to speak as strongly as one would of the obstruction at that point, the blot on the landscape. I refer to raising of the embankment from Grand drive or beyond and where it crosses Union at Lindell, the obstruction of the embankment up to the bridge structure and then the bridge structure itself which as one looks from

the park would shut out practically the view of the houses opposite [fol. 829] and all that charming residential section which lies to the north of the park.

Q. What is the landscape effect of the erection of the two embankments in the park on each side of the proposed depression there?

A. You call them two embankments, I don't see that that is an accurate description; what I have in mind is the effect of the depression as passing through there, which is very similar to the device which has been used for centuries called by the curious name of ha-ha; at Mount Vernon is built what is called a ha-ha to keep the cattle off the home place without the use of a fence and it is a very striking thing, as one stands on the porch at Mount Vernon and looks away from the Potomac River, to see the cattle and sheep grazing beyond the 300-yard limit without the ability to get there; it is done by simply a slight raise in the grade where there is a sharp cut-off similar to the one side of such a depression as this might be and then sloped up gradually on the other side and carried on in the same general grade, so that the eye does not detect the depression at all, and that is what my idea is of what would be the depression here; one can visualize it pretty well if they will go, in the mind's eye, out to the same section where the River des Peres bed runs through the same section, where the streets cross over, one does not think of there being a depression below. One does not think anything about it at all. The street goes right through such as at Kingsbury and Waterman.

Q. What is your opinion as to the effect of the development of the property in the vicinity of a railroad that has been either elevated or [fol. 830] depressed as a result of the elevation or depression?

A. I have felt about it that there were the railroad tracks; some people lived on one side and some on the other, and some that lived over beyond the railroad tracks, and this particularly has come to my attention on the Pennsylvania main line, out through those beautiful suburbs, Overbrook and Marion and Ardmore; it seems to me that that right of way, which is most beautifully maintained, as I have stated before, where prizes are offered for the best kept-up sections, the best planted, the most attractive, the bridges which span the streets together with the right of way itself, virtually cuts the town in two; I have spent a good deal of time in Ardmore, where the development was almost entirely to the south of the tracks; the development to the north of the tracks was comparatively halted. Compare that for instance, with Boston, where the trains run right through that beautiful park section known as the Fenway and one wouldn't know the railroad was there; the bridges pass up over the tracks; now and then there is a puff of steam or smoke and that is all the evidence there is as compared with a continuous raised right of way with trains passing over it all the time.

I am familiar with Kingshighway as it exists near Barnes Hospital. Now you don't know anything about the trains passing under Kingshighway, and if it were raised on a steel or concrete structure it would shut off to a great extent the vista from either the north or

the south looking towards the park in one direction and in the other looking up that beautiful expanse of street.

As I came over to take the train at Tower Grove that very situation [fol. 831] was brought home to me; first, the crossing of Vandeventer by the Wabash viaduct, the unsightliness as compared with the delightful arrangement, and a difficult problem is met at the intersection of those two streets, or the combining of the two streets at Tower Grove, where one does not see the tracks at all; it seems to me that there is a very striking example of the difference between overhead and depressed work.

This upper photograph is of the crossing of Union and Lindell; the lower, I should take it, was a delineation of the Wabash plan for a viaduct at that point. I think the statement I made is thoroughly borne out by that, as one cannot see except for glimpses here and there, anything of the residences on the other side.

Said photograph is marked "City's Exhibit 135."

That is a photograph of existing conditions at Waterman avenue and Wabash tracks.

Marked "City's Exhibit 136."

These two photographs, mounted on the same card, show in the upper part a drawing of the City's plan for the roadway crossing the tracks and the lower picture, a delineation of the Wabash plan. The view shown there is as it will be seen when the respective improvements are made, as closely as can be made in a drawing of that character.

Said photograph is marked "City's Exhibit 137."

This set of photographs is a similar set showing the conditions as they are at Kingsbury and the Wabash tracks.

Said photograph is marked "City's Exhibit 138."

[fol. 832] The other card, the one above is a delineation of the City's plan and below of the railroad's scheme.

Said photograph is marked "City's Exhibit 139."

Q. What you said with reference to an overhead structure at Lindell and Union would apply as well to an overhead structure at this place?

A. It is even more striking in the last set of photographs.

Q. In your opinion, is the passing under a structure of this character at nightfall objectionable?

A. It is certainly very disagreeable work passing through there on a dark night, whether you are in a motor, on account of the obstruction, or on foot, in fear of footpads.

Cross-examination by Mr. Brown:

Q. The only purpose of separating the grades of the railroads and streets is to provide for the safety of the public in using the street as a public thoroughfare, isn't it?

A. Not altogether; I think that is the major purpose, the controlling purpose from the City's point of view.

Q. You will concede, I assume, as all the engineers have conceded, that so far as the safety of the people using the highway is concerned, either plan, the depression or elevation plan, will provide that safety to protect the people from the trains?

A. Yes, but I think my last answer covers the other feature of the objectionable part of the overhead structure in having to pass under the posts with the motors and particularly where the street turns as it does in one or two cases under consideration, and the disagreeableness of going under it at night.

[fol. 833] Q. The only excuse for requiring the railroad to get off the present grade of the street is to protect the public against the danger from the trains, isn't it? I am getting to the basic fact.

A. I would think to protect them in every way.

Q. So that from danger that protection is equal whether it be by depression or elevation?

A. From trains, yes.

Q. When you get to the question of method, which is the most sightly or unsightly, that depends upon the question as to the policy of the City as a municipality with respect to its city improvements?

A. Not necessarily; it is governed sometimes by conditions which cannot be overcome and which necessitate raising the grade instead of depressing it, but I think the modern tendency is wherever it can be depressed, depression has taken place. The City claims the depression plan is feasible. I believe here is a situation where either is feasible so far as the grade separation is concerned.

Q. The only question is which is the more sightly or unsightly, isn't it, from the City's standpoint?

A. I don't think it is the sole question, but that is the main question.

The City of Chicago, in order to eliminate the view of the Illinois Central trains and as part of the municipal improvement itself, filled in Grant Park, and made it the vista I spoke of. I couldn't say whether there was any change made in the railroad itself. They had the opportunity there.

Q. You say the present embankment is unsightly in the park, yet the City proposes to leave the embankment right where it is at a [fol. 834] height of 12 feet and you say in your judgment it will not then be unsightly?

A. Do you realize what can be done with the embankment in sloping the grade away from it? I don't know whether it can be done with the present embankment or not. It would still leave the track surmounting it with the signals, etc., and trains passing over it.

The reason the present embankment is so unsightly and embankment which the City proposes to put there will be a landscape attraction is because, in the one case the slope can be varied; the whole thing can be landscaped and it is not topped off with the track and obvious signal system, which must exist there; it is then a feature of landscape and can be treated as such with the varying

edge at the top of it enough to hide the tracks passing below; that is perfectly susceptible to such treatment.

I did not make those drawings from which photographs are shown.

I am familiar with the Wabash bridge over Grand Drive in the park; I do not regard it as unsightly. It is quite possible, with the progress that has been made in concrete construction, to make a very ornamental overhead bridge. I believe these were made from the blue prints of the Railroad Commission. I believe there was a view of Waterman avenue, as it exists today, in there.

Q. I show you a photograph of another view as it exists today, where there is a cut; it is marked "Exhibit 122"; I think that is taken south of Delmar, where the track is now in the cut. That is a very unsightly thing, is it?

A. It is from the trains, but I have pointed out the same condition [fol. 835] pretty nearly, existing in the present bed of River des Peres, in this same section; that is not sightly when you look over the parapet of the bridge that spans the cut itself, but from the street one never sees it. I have passed over it many times in months and wouldn't know what was in the cut; it ought to be cleaned up, that should.

Q. How about the view of the property owners along the side of cuts where there is a depression; they are not able to escape that view, are they, any more than if they lived along the River des Peres?

A. It is a reversal of form there; you look down at the cut instead of up at the embankment; instead of trains going by the windows, they go below the surface.

Take the conditions in New York, with elevated roads, see what they did to Third avenue and Seventh avenue. I don't say a parallel situation would be caused here, because there are greater distances between the backs of houses, but would you want to live in any of these houses fronting on the elevated in New York or Chicago?

On the Back Bay System in Boston many of those buildings back up against the railroad track; some of those apartment houses, although below grade there, there isn't the disagreeable effect of the trains coming by their windows.

You know in Chicago they have difficulty in being so near the lake level of going down; they are forced to build overhead in order to separate the grades. Chicago is a problem in itself; they have had to put a great many of their tracks overhead on account of the water situation; they cannot drain it.

[fol. 836] JOHN COULTAS, being duly sworn, testified as follows:

Direct examination by Mr. Hall:

I live at 950 Beach avenue, St. Louis, and have lived in St. Louis forty-five years. I am a builder and contractor. I own property on Delmar, just west of the Wabash tracks. I have owned that

property a little over thirty years. My property is at the northwest corner of Rosedale and Delmar; it is improved with a two-story brick building and another building farther up, west.

Q. How long have you been acquainted with that land lying south and north of Delmar, along the Wabash tracks and the River des Peres?

A. Ever since the war, before the Wabash tracks were built; it wasn't built until 1876; it was commenced in 1875.

Q. Just describe to the Commission what you know about the character of that land along there, especially south of Delmar and along the Wabash tracks as it existed at that time?

A. Before they built the Wabash tracks that was largely a swamp all the way from the city limits to Lake avenue; there were little hills here and there, but most of it was wet land. The Wabash was built through that land. That was my favorite hunting ground for duck and snipe.

Q. When the railroad was built through there, what was the elevation of the railroad tracks with reference to the general level of the ground?

A. They built it up about 5 or 6 feet above the land, it was so swampy; of course they couldn't build on the swamp, so they built it up 5 or 6 feet.

[fol. 837] After the Wabash was built a farmer who had to get at a piece of land that lay west couldn't go over that high bank, he went underneath a trestle; a little creek run through there south of Delmar and when it wasn't too wet he could drive under there to get to that land.

Q. What, in your opinion, knowing the land as you do, would be the effect of lowering the tracks of the Wabash Railroad, 18 or 20 feet below where they are now?

A. I shouldn't think it would be considered for several reasons; if you done that, you would have to raise Delmar. You don't know what you are coming to in there. I spent my life digging cellars and such things and I would have to have it bored to know what that ground was.

The flood of 1915 was the worst we ever had. The River des Peres didn't overflow at Delmar, because there was a good channel south of Delmar, until they graded that track up and after that it has been nothing but overflow ever since.

Q. The narrowing of the channel and the filling in of the channel has made it so narrow it wouldn't carry off the water?

A. It can't carry it off; it is made so narrow now there isn't a channel that would accommodate half the water.

There has been thousand and thousands of tons of dirt dumped into the River des Peres and I couldn't remember all of that. It was gradually being narrowed and narrowed and when the flood came in 1915 the River des Peres didn't take but just one-third of the water. I witnessed the flood of 1915. The biggest half of the water went down the Wabash tracks, then another big portion went down [fol. 838] De Giverville avenue. There was a sufficient current going down De Giverville to float railroad ties, etc. I was there and seen

all those things floating down De Giverville avenue. There was such a current at De Baliviere that my son and I in trying to get across there, it nearly took us off our feet on De Giverville avenue.

We were wading up to my waist; my tenant at Rosedale telephoned me he was flooded out of the cellar, and that the water was coming up in the first floor; he telephoned me to try and help him get his stuff up in the second story; we had to wait, as we couldn't cross anywhere from Clayton road to Easton avenue, and we climbed over the University car line.

Delmar avenue was under water for at least 1,000 feet, right from my garage up there about 400 feet west of Rosedale to the Pageant Theater, that was all under water, up to the Pershing Theater. It was all flooded from the corner of my garage; it stopped at the door. That is the University Garage and there was a boat floated up close to the summer part of Pershing Theater; the boat floated up that far. That was a couple of hundred feet east of De Giverville.

Cross-examination by Mr. Haid:

Q. Your place at Rosedale and your University Garage are both built in a hollow, are they not?

A. No, not in a hollow, about 6 or 7 feet above it.

Q. Isn't the foundation of the building entirely exposed, down in the hollow, the whole of that cellar?

A. It is at the rear, but not in the front. There was water passed over Delmar avenue, west of my Rosedale building, between the store and the garage; it passed over there and came in at the rear [fol. 839] doors of those stores and out at the front doors. Some of it passed over Delmar avenue, went across Delmar and down, it couldn't go up to Rosedale, but it ran alongside the buildings that are there and into the River des Peres.

Q. Isn't it a fact that no water passed over Delmar avenue, west of the buildings standing on the south side of Delmar, where the express company is?

A. It went into that cellar and filled it level with the floor. It couldn't go through the bank there; part of it is banked up, but it went over Delmar, the south side of Delmar.

I waded in over a foot of water when I came down Rosedale, to get to my store; on the north and south side, too, there was a foot of water there.

I was there in the crest of the flood and carrying things upstairs for that man and there was a foot of water in that store; it is on the west corner of Delmar, on the northwest corner, and there was four or five of us carrying the things out of the first floor, upstairs to keep them out of water. All of that property over there is in that low place. The property is some 5 or 6 feet below the pavement.

Mr. Hall:

Q. The floor of that store isn't 4 or 5 feet lower than Delmar avenue, is it?

A. No, a step-up, and the water was at least a foot up in the store

there; it flowed some across Delmar and when it struck that embankment on the south side of Delmar it couldn't run up that, so it flowed down east on Delmar and off into the river and down the Wabash tracks.

Mr. Rodehaver:

Q. Providing the Wabash raised their tracks there, or they are compelled to raise them, and we have a similar flood, would that [fol. 840] make any difference to your property?

A. It would make a great deal of difference to raise Delmar avenue, if you raised Delmar, you are going to drown some people north of Delmar, because the water was so deep north of Delmar when the flood was on; I saw two horses drown just north of Delmar.

Q. Providing the City has provided for an adequate plan for carrying that water off, what then?

A. The City has already let it go too far; they can't now; there is a right of way of 60 feet through there and houses are built on both sides of that 60 feet.

Q. If they depress the Wabash tracks, will that make any difference?

A. If they don't change the grade any on Delmar avenue, it wouldn't make any difference, but if they raise the grade of Delmar it will make that much more water on the north side; then those people on the north side living in those little frame houses, if you made the water deeper than it was in the flood, they will be drowned out and it will wash them off the foundations. I don't want to see any more water than what there was, because it was dangerous as it was; as I tell you, there were two horses drowned right there at that flood. If you raise Delmar everybody will be in danger of being drowned. Of course, it would depreciate every bit of the property that lays north of Delmar, but it isn't the dollars and cents I'm thinking of; it's the life and death of the people; they will all be drowned and washed out of their homes.

Q. They could move, couldn't they?

A. If it comes in the night, how could they move in the midst of a flood like it was that day? I suppose they could move before the flood.

[fol. 841] Mr. Brown:

Q. Those who lived south could also move?

A. They are safe; they got a dam built across Delmar and they are safe; the poor man suffers and the rich man is safe.

Mr. Hall:

Q. How many feet of ground do you own on Delmar?

A. Four hundred feet, facing on Delmar.

Mr. Bowen:

Q. Did the City widen Delmar in front of your property?

A. Yes; they paid me a little damage. If you want to know

how the City treated me on that—they told me they would pay for the damage that they done and when they come to pay me, they paid \$1.00 a foot for that property and the fellow across the street, because he belongs to the other side, got \$4.50 a foot.

Q. When the City raised Delmar boulevard, did they pay you damages then?

A. There is another case where I got the worst of it again; when they raised it the Street Commissioner said they would pay me all damages; when they got the work done they said they couldn't pay all of it and for me to sue for that; I told them they promised me they would pay whatever damages was done, and asked why they didn't pay; they said they couldn't and it was not the law and told me to sue. I sued and got judgment against the City for about half of what it was worth, and then the lawyer for the City turns around and tells me he would fight that up in the Supreme Court unless I reduced the damages, and offered me \$200 less than I got and I took it instead of fighting it to the Supreme Court.

When my property was damaged by the flood I had a bill introduced in the Board of Aldermen, but the City lawyer killed it. Our alderman for our ward and the Street Commissioner said it was a shame for me to have to stand for that, and Mr. Hart got up a bill to give me relief and the City Attorney threw it out, and I stand today with \$2,200 damage done me and nothing for it.

Q. Did you ever tell the City officials you would come up here and get even with the City for those outrages?

A. No, sir; I didn't; I never said any such thing. I pocketed my loss and said nothing.

At this point an adjournment was taken to 10 o'clock March 15, 1922.

L. R. BOWEN resumes:

I would like to reply to a question asked me by Mr. Brown concerning which I asked time to look up with reference to the estimate submitted by Mr. Pollock for grading and track work in connection with the City's plan.

I have checked up those estimates. Mr. Pollock submitted a total estimate of all grading and track changes for entire City plan, including work outside city limits; we told him to separate his estimate into cost of work outside city limits and inside city limits; he allocated to the work outside city limits a total amount which Mr. Brown referred to as \$35,000; just how he arrived at that amount is not shown in his estimate, but going over the details we note on page 4 under item "D—More Embankment," there was shown 26,000 yards of embankment from city limits to Etzel; 7,000 yards of embankment for industry tracks from city limits to Etzel avenue, [fol. 813] and 4,000 yards of embankment for approaches to the crossing at Bartmer, making a total of 37,000 yards of embankment; the estimated cost of grading out that earth in the City of St. Louis, taking it out and making this embankment he figured at 95 cents a cubic yard, which for that work would make a total of \$35,150; the question would arise as to how much should be charged for this

work outside city limits and how much for work inside city limits, because it was excavated in one place and placed in embankment in the other place. I think it would be unfair to charge the entire cost of that work to the section in the county; in my judgment a proper division would be half the cost to excavation and half to embankment; on that basis the proper amount chargeable to work outside city limits would have been \$19,167 in place of \$35,000, as mentioned in Mr. Pollock's estimate. That is a pertinent question, however, because the amount of work done outside of the limits is subtracted from his total estimate. If only half this cost is chargeable to work outside city limits the City's estimate as presented by Mr. Pollock should be increased by \$17,425, plus 10 per cent, which we have added as usual, making total increase in City estimate of \$19,167.

We would have brought Mr. Pollock to go over that, but he is building a railroad in British Honduras and is not expected back before the 1st of June.

With reference to the viaduct proposed by the City at Delmar, it is of the simplest construction, more so than any viaduct its size that has been built in St. Louis, consisting only of a small bridge, a [fol. 844] couple of retaining walls, a culvert, a lot of fill and some paving; it is in no way difficult, hazardous or expensive to construct.

Criticism has been made with reference to a plan that proposes to pave on a fill without waiting a long time for fill to settle; attention has been drawn to the situation at Union avenue viaduct; Union avenue viaduct fill shows considerable signs of settlement; the fill at the point of deepest settlement is 46 feet deep; the fill is placed against high retaining walls, the bottom of which slope inwardly; universal experience of placing fill against retaining walls is that the friction between the earth and walls prevents the earth from settling for a long time; that situation has aggravated the condition at the Union Avenue Viaduct; there the fill was allowed to stand for about two years before final pavement was placed, but the railroad company that built the bridge and placed the fill used no mechanical means to compact the fill. A fill can be settled without waiting for a long lapse of time, it has been done repeatedly in this and other cities where requirements for traffic necessitate immediate paving of streets placed on embankments. The south approach along Vandeventer avenue, of the Tower Grove viaduct was settled by placing pools of water on top of fill; the pavement was laid immediately after laying the fill and shows no marked signs of settlement; on our Chouteau avenue viaduct paving was laid on a 20-foot fill immediately after placing of fill; the contract for pavement was let and contractor on work before filling had been entirely completed; that fill was settled by the City by forcing streams of water down through the fill, by using three-inch fire hose and long steel pipes; [fol. 845] that fill has shown no marked signs of settlement; there has been a small amount of settlement in a shallow portion of fill near the north side of bridge, where the work of settlement apparently had been improperly done.

Criticism has been made of washing of side slopes; in all grade separation projects of which I have become familiar, the City has

been required to maintain street paving; that obligation, I suppose, would rest upon the City in this case, so that should there be any washing of side slopes, it would be the duty of the City to maintain those side slopes, but we have every expectation and belief that just as soon as this grade separation project is settled at Delmar, that property will build up immediately to the railroad tracks, because the property is too valuable and taxes on it are too high to long remain unimproved; of course, such construction would eliminate any further danger of the washing of the slopes.

It has been offered in evidence that it will be necessary to construct a temporary street along the north side of this project to take care of traffic during construction; that would mean the creation of another grade crossing in lieu of present grade crossing, and according to the railroad company's estimate would cost \$57,300; such a temporary street would be impracticable to build, because it would prevent the raising of Hodiament avenue, which is part of the plan, and which raising extends all the way from Delmar to the next northerly street, Enright; where such a street would join again with Delmar, the plan provides for raising Delmar at that point, which would make more difficult the construction of such an unnecessary and expensive side street.

[fol. 846] It has been stated by one of the railroad engineers that more piles should be placed under retaining walls shown on City's plan; the City's plans show two retaining walls, one along the west side of Hodiament, between Delmar and Enright, and one along west side of Wabash right of way, running from Delmar northwardly some 300 or 400 feet; the spacing of piles shown under these retaining walls corresponds to spacing of piles used under retaining walls at Chouteau avenue viaduct, with this difference, the west of these two walls proposed at Delmar has heights from the base of retaining wall to top, varying from 13 feet to 21.9 feet, while those at Chouteau have heights varying from 17.73 feet to 21.6 feet. The average height of the west wall at Delmar is 19 feet, while those at Chouteau average 20.9 feet. The soil at Chouteau avenue viaduct was very poor—quicksand was encountered in sinking one of the piers; the wall along Hodiament avenue will probably not require any piles at all, because the contours show that present surface of ground does not consist of fill. Piling has been shown there of same spacing as used at Chouteau avenue viaduct; the average height of wall shown at Delmar as compared with average at Chouteau is as 17.4 is to 20.9 feet. We are positive the construction shown at Delmar is ample, safe and strong.

The City previously presented its own estimate for cost of bridge at Dalmar; also employed a contractor to estimate cost of work. These estimates have been presented. Both estimates are high and were high at time submitted. Both based on use of union labor throughout work; it has not been our experience that large viaducts [fol. 847] in St. Louis have been built with union labor; the construction does not require much skilled labor and contracts have been usually awarded to contractors, who carried on work with cheap labor; at present the rates for union labor in St. Louis are probably

25 per cent higher than rates for that class in any other large cities in the United States; the discrepancy between union labor and ordinary market for labor is so great that if this viaduct had been let at the time the estimate was given or today, there is no question but what the cost would have been materially lower than shown in City's estimate. Since these estimates were presented, the materials alone that would enter construction of viaduct at Delmar have been reduced by \$38,381.50.

List showing reduction in prices of materials marked "City's Exhibit 140."

In estimating cost of filling at Delmar avenue viaduct, 70 cents a cubic yard was allowed; it was stated 110,000 yards were required; we expected to get 30,000 yards of fill from the United Railways for 50 cents a cubic yard. The engineer of Fruin-Colnon has testified for the railroad with reference to the fill. That company took a contract from the City for grading Oakland avenue, adjacent to the River des Peres at the south side of Forest Park; this was special tax work; the amount of excavation was 11,409 cubic yards; amount of fill, 44,639 cubic yards, requiring the bringing to the site of 33,230 cubic yards; that company made an arrangement with the United Railways to bring in all of the fill required. Work started July 11, 1917, and was completed July 11, 1918; for that work the City paid to the [fol. 848] Fruin-Colnon Contracting Company, in special tax bills 49 cents a cubic yard.

We stated we expect to get at this viaduct 20,000 yards of free fill. At the Chouteau Avenue Viaduct we received in four months in 1916, 24,000 yards of good dirt, which was all the fill required for the bridge and for raising up an adjacent piece of property. Last year the City received 105,000 yards of free fill at and adjacent to the North Market Street dock, of which 70,000 yards were clean dirt. At Forest Park during last year for a number of small projects the City allowed good dirt to be dumped and received 12,000 yards; in past years the City received as high as 160,000 yards of fill in Forest Park.

We have made arrangements for procuring dirt for the construction of the viaduct. For balance of work requiring 60,000 yards we figured it would be necessary to bring in earth; we secured a permit from owners of the De Mun tract on the west side of Skinker road, a short distance south of Clayton avenue, and Mr. Manegold testified yesterday as to cost of bringing that earth to the viaduct.

Plat of that property marked "City's Exhibit 141" and permit marked "Exhibit 142."

We allowed in our estimate \$1 a yard for the 60,000 yards additional earth required. There is no difficulty in getting permission to grade off property adjacent to this viaduct, nor in getting the owner to pay some part of the cost. We are not now in position to make a definite agreement with the owner, it can't be expected that we can get from him anything other than a permit to take the earth off his land. I have another permit offered us by the trustees

[fol. 849] of a tract of land bordering the Terminal Railway Company's right of way, property at the western city limits; this tract of land contains sufficient earth above the level of the Terminal Railroad tracks to do all of the filling required in connection with the Delmar Avenue Viaduct. This permit gives the City the right to grade off 60,000 to 100,000 yards of earth and agrees to pay all cost of installing a switch on that property to facilitate the grading of the earth.

Exhibits marked "City's Exhibits 143, 144, 145 and 146" filed

We have examined title of trustees to this property and find they have full rights to dispose of property or sell it or lease it or do any other act in connection with its disposal.

To estimate given by the grader yesterday of cost of bringing that earth to this site must be added cost of railroad transportation; the rate per car on the Terminal West Belt is \$3.50 for delivering a car to the Wabash tracks at Page; from Page to Delmar is a short distance of about 3 miles, but the rate on the Wabash between those points is 2 cents per 100 pounds, amounting to about \$21.60 for a car containing 40 yards; on the other hand the Terminal West Belt rate for switching a car of earth all around the eastern part of the city and out through Mill Creek Valley and delivering it to the Wabash at Ewing avenue railroad yards is \$7 a car, from there the Wabash has a rate out to the industries between Delmar and Page of \$9 a car, which added to the Terminal Railroad Company's rate would make \$16 a car of 40 yards, which would add 40 cents to the cost given by [fol. 850] Mr. Manegold. If we should want to bring in earth that way the traffic manager of the Wabash Railroad Company has told us he would make application for permission to give special rate in case we wish to handle 1,000 cars in this manner. Such special rate would materially reduce cost of bringing such material to the city.

I have examined the Wabash's estimate of cost of the Delmar avenue project; the first estimate submitted by the Wabash is Exhibit 46, showed cost of Delmar Avenue Viaduct at \$1,024,065; at the last hearing they submitted a second estimate of \$958,095; this seems to be rather a high estimate; in the first place it has an item of \$57,300 for temporary relocation of Delmar boulevard and no details whatever were furnished showing such proposed location. It has an item of \$30,000 for a borrow pit which is wholly unnecessary; it has an item of \$184,900 for legal expenses and damages; no separation is made as to amount that will be paid for legal expenses and amount for damages, nor has any detail whatever been furnished as to what the individual damages to any particular piece of property are; it has items of telephone expenses, \$55,000, United Railways Company's expense, \$31,600; as the cost of the work to be divided between the Wabash and the City of St. Louis would not embrace any of these items and as the franchises of all these companies require them to adjust their facilities to changes in the grades of the city streets, we made no attempt to determine the amount of cost to them for such changes. It is probable that the United Railway Company's expense at Delmar might be \$31,100.

The unit costs used in the Wabash estimate where actual quantities of actual work are shown are almost exactly the same units previously furnished by the City, excepting the item of embankment, [fol. 851] for which their estimate in addition to paying \$30,000 for borrow pit was \$1.10 a yard and an item of \$13 for all classes of concrete. Thirteen dollars agrees with the City's estimate for the highest class of concrete—112:4 mix, but not the poorer mixes.

I submit a comparison of quantities estimated for this work as shown in the Wabash estimate and that submitted by the Woerman Construction Company; it will be noted that there has been added to the quantities furnished by this company, in almost every instance, amounts varying from 10 per cent to 125 per cent. The 10 per cent alone added to the quantities by the Wabash engineers and then 5 per cent on top of that for engineering would make a total of 15½ per cent for engineering and contingencies which is unusual in any construction work much less a simple piece of work of this kind where the fill forms so large a percentage of the cost. On the second page of this exhibit is a comparison of the quantities estimated by the City and by the contractor; it will be noted that the variations in those estimates are very small.

Said paper is marked "City's Exhibit 147."

Part of the construction at Delmar consists in a culvert to support the fill required for raising the street; we built over the River des Peres two culverts of almost exactly the same construction, one at Kingsbury and one at Waterman. I offer in evidence pictures showing construction of these culverts.

Said photos marked "City's Exhibit 148."

This Exhibit 148 shows the completed work and work during construction. It is desired to draw attention to the fact that in making [fol. 852] the excavations for the side walls at this culvert, and they were carried down to solid rock, it was not found necessary to place bracing for the support of the walls because the clay there was so hard and good. The third picture shows another view of Waterman, and shows similar cut in the bed of the River des Peres where no bracing was necessary for side slopes of the excavation. Fourth shows method of construction at Waterman avenue. Fifth picture shows what a small plant was necessary for the work. The culvert at Kingsbury boulevard had to be built under an existing bridge, and that is shown on the sixth picture. Seventh picture shows this culvert about completed under that existing bridge. Those culverts were built in 1912; the cost for that work was \$83.75 a running foot. This was more difficult and costly than that at Delmar because of the necessity of moving the entire plant to the second bridge and because the length of the two culverts was so small, requiring a larger amount to be allocated to the cost of the plant. On the basis of the cost of those two culverts, the culvert proposed at Delmar boulevard, exclusive of grading of the channel, would be \$114.20. The estimate submitted by the Woermann Construction

Company and used by the City in this case amounts to \$212.05 a running foot for the culvert proposed at Delmar, and the estimate submitted by the Wabash provides \$248.90 a running foot. We have had considerable experience in estimating the cost of bridges in the City of St. Louis, and are very sure if this viaduct at Delmar were built at the present time it would not cost over \$480,000.00, and that the City of St. Louis would welcome an order from this Commission requiring the City to build this viaduct, providing the [fol. 853] railroad company is required to pay its proper share, and the other public utilities are required to adjust their facilities to the change in grade and requiring the City to pay all cost of construction in excess of \$480,000.00.

I have examined the Wabash temporary plan submitted.

The Wabash furnished no details of their temporary plans excepting sketches of proposed bridges at Delmar and Hamilton, one cross section of railroad embankment between Delmar and Hamilton, and the general profile for entire plan, which shows the grade between Hamilton and Delmar, but not the grades of run-offs necessary for this temporary plan.

The Railroad Company's plan for bridges at Delmar shows four lines of piers in the street, two of which are within the roadway of the street; the street railway company, owning tracks along Delmar, now has a line of poles down the center of the street; this line of poles plus two lines of piers, which the Railroad Company's plan proposes, would make three lines of obstructions in the roadway of the street, and two on the sidewalk of the street.

This is Wabash Exhibit 37. There was a drawing submitted by Mr. Cunningham, a picture of a bridge at Delmar showing a clear span, but my understanding is that this is the official plan of the Wabash and the one on which their estimate is based.

The construction of a single-span bridge across Delmar would be a very difficult thing, much more difficult than the construction of a bridge of a number of short spans; if it were made a girder type it would require one of two things, either the raising of the [fol. 854] height of the railroad track throughout that whole distance, or the lowering of clearance over Delmar boulevard; it would materially increase the Railroad Company's estimate of cost for a bridge over Delmar if the tracks were raised. The only method by which we can discuss the differences in costs is to have a definite plan and definite estimates on a definite plan.

Any obstruction in the roadway of a street is dangerous to traffic; the United Railways Company's poles in Delmar boulevard and the poles they formerly maintained on Page have been continually struck by automobiles; last year a man was killed at Delmar and De Baliviere by colliding with one of the poles now existing in the street at that point. During last year there were ninety-five collisions with traffic lamps placed in the street to make more safe traffic.

List of traffic lamps broken during 1921, marked "City's Exhibit 149."

In my judgment the construction of a bridge at Delmar as proposed by the Wabash would be simply changing one hazard for another. The plans for the bridge show abutments for four tracks and spans for two tracks. That would leave an unsightly condition over this boulevard until such time when the bridge would be completed. In this temporary plan is shown the bridge at Hamilton avenue; that avenue now descends with a steep grade of 4 per cent to the Wabash tracks; the streets north and south of Wabash tracks at that point are ten feet above grades of the tracks; the [fol. 855] street at that point is on a curve; the railroad plan shows a bridge there with three lines of piers in the street. This bridge would also add a hazard to traffic on that street. In order to provide room for the traffic in the street, the space of which has been taken up by these piers, it is proposed to reduce the sidewalk to six feet. This will leave narrow, dark, dangerous passages for pedestrians. This bridge would be unsightly in a residence district. It is shown to have abutments for four tracks and spans for two tracks. Until the far distant date when the Wabash might want four tracks that unsightly situation would remain.

I made a comparison of the City's Delmar plan with the Wabash temporary plan. We made no estimate of the cost of the Wabash plan, because there were insufficient details on which to base an intelligent estimate. The Wabash estimate for its temporary plan of raising tracks over Delmar and Hamilton is \$670,093; in that estimate they make no provision for sodding the slopes of the railroad; the City's estimate of cost of the Delmar avenue viaduct, as submitted by the Woermann Construction Company, is \$538,146.99; as estimated by the City, \$528,653.79. If the Wabash estimate of its own plan is correct, the excess cost of the Wabash plan over the City's plan at Delmar, as compared to the Woermann Construction Company's estimate, is \$131,946.01, and as compared to the estimate prepared by the City Engineers is \$141,436.21, for those differences we could build quite a number of bridges over the Wabash tracks at Hamilton.

Mr. Hall:

[fol. 856] Q. How many bridges could you build for \$131,946?

A. Seven. I will submit a comparative estimate of cost of the Wabash and City plans.

Said exhibit is marked "City's Exhibit 150."

A number of miscellaneous objections have been made to the City's plan, concerning which we don't think worth while to offer evidence in rebuttal, such as more obstructions to view in the City's plan, because it has 42 embankments and the railroad's has only one; such as the City's plan is more dangerous to trespassers, or Mr. Loweth's objection to the City's plan because hold-up men can jump off the bridges onto trains passing beneath and make their escape, we don't think worth while discussing, nor believe that anyone will seriously consider that when a train enters a cut the smoke will obscure the view of the signals, the trespassers will line

the right of way, the rails will become wet and slippery, the cost of operation will mount up, the sun will cease to shine on the ballast, the earth will vibrate and shake down the houses and that pilferers will come out and rob the trains.

Before offering evidence on the four principal objections—drainage, clearance, grades and costs—we will discuss one objection, because it has been so frequently made and sounds so reasonable and seems to correspond to the average experience:

It has been stated that engines running in cuts will issue smoke just about the level of the ground, which will make it harder for the smoke to dissipate and therefore becomes a nuisance to adjacent property, while if placed up on a high embankment where the air can get to it, this smoke will be carried away and not [fol. 857] become objectionable. The error in that assumption has been suggested by Mr. Cunningham when he stated that the blast from a locomotive passing under bridges is so strong that it acts as a sand blast and destroys in time steel work of bridges under which the train passes and makes necessary the protection of bridges by cast-iron plates or other devices. That statement is very true, and is the universal experience, especially where the clearance is low and the railroad on a steep grade. I think it is generally known that the draft of a locomotive is caused by the discharge of the steam through a small orifice in the funnel, which creates a vacuum and sucks up out of the fire box the smoke and cinders and soot and throws it up with tremendous force mixed with steam; the smoke cloud that shows is this steam and the very finely divided gaseous particles, but the invisible discharge or the solid constituents of the discharge are pieces of cinders and large pieces of soot and unburned coal, which are thrown up and make a continual invisible movement, and they drop and settle close to the tracks. This has been brought out by a very exhaustive study which was made of the smoke discharged from locomotives by the Committee of Investigation on Smoke Abatement and Electrification of Railway Terminals of the Chicago Association of Commerce. The report of this committee, of which William F. M. Goss, dean of the College of Engineering of the University of Illinois, was Chief Engineer, was published in 1915 and consisted of a quarto volume of about [fol. 858] 1,200 pages, now in general circulation among engineers. I give that report as authority for following data on smoke from locomotives. In considering smoke they took into consideration all of the products of combustion that were diffused in the air. They state that smoke possesses a three-fold character, consisting of its visible properties, its solid constituents and its gaseous constituents. The gaseous constituents are well known, consisting of carbon dioxide, carbon monoxide, oxygen, nitrogen, sulphur dioxide, sulphur trioxide. They state that as the capacity of the atmosphere for absorbing these gases is very great, their effects as polluting agencies are relatively slight. Only of these gases may it be said that the elevation of the smoke stack would tend to hasten their diffusion and absorption by the atmosphere. The visible properties of smoke are the tar and water vapors and very finely divided ash particles

that are light enough to remain suspended for a period in the air. They form only an insignificant part of the solid constituents of smoke and have no relation to the quantity of solids discharged in the smoke. The solid constituents are ashes (noncombustible mineral matter), combustible matter (carbons or soot), tarry matter and sulphur. These are the objectionable constituents of locomotive smoke. They are of considerable volume. The average amount of solids in smoke from locomotives for the different services in Chicago was 1.9 per cent of the amount of coal consumed. In Chicago it was found that for every mile of track there was delivered annually thirteen tons of cinders and soot. On this basis for the length of track under consideration there would be about thirty-[fol. 859] nine tons of cinders and soot delivered annually if the traffic on the line here corresponded with the average in the City of Chicago. The quantity of solids discharged in smoke has no direct relation to the visibility of the smoke. As all of the solids discharged are heavier than air, they will settle to the earth; it must necessarily follow that the only effect on the solids of smoke produced by raising the height of the smoke stack as by track elevation is to increase the area over which they will spread while lowering the elevation of the smoke stack as by track depression will reduce their area of distribution. In the test in Chicago to ascertain the distribution of the solid constituents of smoke, they set pans out from the center line of the track varying distances, and on the basis of one of these series of tests we have prepared a diagram showing the projectories of smoke particles as thrown up from the locomotive as outlined in their tests; from this diagram it will be noted that if the tracks are depressed, the distribution of the solid constituents will be just slightly reduced, whereas if the tracks are elevated, the distribution will be slightly increased; in neither case is it of sufficient importance to take into consideration.

Diagram marked "City's Exhibit 151."

Mr. Senti:

Q. In considering these criticisms, have you any data on storms?

A. Yes. With reference to drainage provided in City's plan in previous testimony I referred to paths of storms of 1900 and 1915, as shown in August issue of the Monthly Weather Review of the [fol. 860] U. S. Weather Bureau. I offer in evidence a picture of diagram of paths of those storms.

Said picture marked "City's Exhibit 152."

A number of times reference has been made to a report known as "Storm Rainfall of Eastern United States," prepared by the engineering staff of the Miami Conservancy District, of which staff Mr. Arthur E. Morgan was Chief Engineer. I offer this in evidence to clear up and make more intelligible those references and draw attention to a few points in this report.

Said report marked "City's Exhibit 153."

The occasion for this report was the flood of 1913 in the Miami Valley District that caused \$200,000,000 damage and nearly destroyed Dayton, Ohio. On page 31 of this report it states:

"After making the extensive investigation of storms in the eastern United States, it is believed that the March, 1913, flood is one of the great floods of centuries in the Miami Valley. In the course of 300 or 400 years, however, a flood 15 or 20 per cent greater may occur."

On the same page:

"From the records of floods in the Danube at Vienna covering 900 years, in the Seine at Paris covering 300 years and in the Tiber at Rome covering 1,500 years, it appears that the greatest flood of 1,000 years is not much in excess of the greatest in 100 years."

On page 271 the storm of August, 1915, that did the damage at [fol. 861] Delmar, is compared with this Miami Valley flood. I draw attention to the fact it states during the first day of the flood of August, 1915, it was 10 per cent greater than the flood that did the damage in the Miami Valley; the second day the flood in 1915 was 8 per cent greater; the third day the flood of 1915 was 25 per cent greater; the fourth day 23 per cent greater than the flood that did the damage in the Miami Valley, and was the occasion for the preparation of this report. Page 112 is given the division between the storms as listed in this report as northern storms and the storms that are listed as southern storms; all storms having their centers north of the north line of North Carolina, Tennessee, Arkansas and Oklahoma were listed as northern storms. On page 116 is listed all of the great northern storms; the storm of August, 1915, is known as Storm 151, and in the table adjacent to page 116 it will be noted that the greatest of all northern storms ever recorded is the storm of August 1915. As this storm had its origin in the Gulf of Mexico and crossed the Southern States, it is also recorded in the list of great southern storms, and that portion of it south of the line fixed for northern storms was one of the greatest of southern storms. To get an idea of the total water brought on by that great rainfall, on page 306 there is given the area of the land that was covered to a depth of six inches, and the average depth in that area; the area given is 107,000 square miles, and the average depth is 8.7 inches, making a total rainfall of 930,900 inch miles.

Mr. Hall:

Q. Does this Exhibit 148 represent the opening through which that terrible flood is to be provided for in the event of its return? [fol. 862] A. Yes, sir. Inasmuch as the engineers who testified for the Wabash have agreed with the engineer that testified for the City that with the culvert extended to Waterman as shown in City's plan, the height of the water at Delmar, should we have a recurrence of that same storm, would not raise above elevation 80, we think we may consider there need be no further discussion of an overflow of the Wabash tracks at Delmar and there may be no repetition of the

false charge that the City proposes to make a sewer out of the right of way of the Wabash.

With reference to seepage water, Mr. Cunningham stated when he built the present Grand Drive Bridge he encountered so much water in carrying down his excavation that it became necessary for him to support the foundations of present bridge on the foundations of the old bridge. I read the report of the engineer who built the original bridge. This is official report of the Park Commissioners of Forest Park made to the County Court January 1, 1876:

"The viaduct which carries the railroad over the main drive entering the park at the northeast corner and which is now in course of construction will have a span of forty-one feet and a clear height above the road of nineteen feet six inches; it consists of two stone abutments with wing walls at right angles to the road and an iron plate girder superstructure."

It will be noted that no reference is made to any so-called "T" walls that would extend so far back from the face of the abutment that a bridge having a span of thirty feet greater would set upon them. He states further:

[fol. 863] "The contract for its construction was awarded to Shickle, Harris & Co. for the sum of \$16,515. The cost of this work will be increased some \$800 by the extra cost of foundations which had to be carried lower than originally designed on account of the greater depth of vegetable mold disclosed during construction."

He states further:

"The masonry of the eastern abutment with its two wing walls is completed and the footing courses of the western abutment are laid."

I offer letter from Mr. Carl Gayler on this same bridge.

Said letter was marked "City's Exhibit 154."

Reference has been made to the undercrossing of the Suburban Railway Company west of the Union boulevard during the World's Fair. I have here a plat showing the original contours of land in that vicinity as taken in 1896; on this map is platted the right of way of the Suburban Railway as it passed under the Wabash tracks at that time; at the time this railway was built I am advised this property had been graded to very nearly present grades. It will be evident from location shown on this railway that at the point where it passed under the Wabash tracks there was originally a gully for the passage of water from the north and that a culvert existed under the railroad tracks at that point. The grades of the railway built at that time, shown on the plat, were taken from profile of that railway as kept in the office of Mr. Julius Pitzman. It will be noted the grade of that railway track was about three feet lower than the City's proposed grade for the Wabash at that point; it is also evident that the slope of this track down from Union would act as a drain for the territory in that vicinity.

Plat marked "City's Exhibit 155."

Conditions at Grand drive in Forest Park have no bearing upon soil conditions as affecting the City's plan at Grand drive; the City's plan provides for raising the tracks a couple of feet above ordinary level of ground at that point. Conditions have materially changed since 1904 by the construction of sewers not far from the site of Grand Drive Bridge; this point as shown on model is the Wells spring house in Forest Park; in 1904 there was a large spring there which afforded fine drinking water; that spring has been dry for years.

There is one scientific proper way to determine at present time what soil conditions are in a project of this kind, that is to make borings and test pits; such borings and test pits have been made and the evidence of the test pits has already been furnished in this case. I personally observed each of these test pits; in every case there was encountered nothing but the best hard clay; as the digging proceeded the clay became so hard it was necessary to excavate with a pick. I don't mean that there will be encountered, between Union and Delmar, nothing but fine, hard clay; the character of the clay in this vicinity is such that it is almost impervious to the passage of water, and wherever fills have been made on top of that clay the chances are that the clay will hold water in that fill. Between Union and De [fol. 865] Baliviere, as shown by this plat, there are two points where draws cross under the Wabash tracks; one is at the point where the railway company was carried under the tracks during the World's Fair and the other is just east of De Baliviere. I have no doubt that in making excavation at those particular points water will be found in that soft fill on top of the original hard clay, but there is also no question but that the drains provided in the City's plan will amply take care of whatever seepage water is brought in through that fill.

Q. Have you given consideration to the criticism that has been directed against your testimony on clearances and the exhibit on clearances which you introduced?

A. I have. We heretofore presented an exhibit that shows the clearances over railroad tracks of all the permanent structures in the ten largest cities of the United States; the average of those clearances was eighteen feet four and a half inches. Criticism has been made of that report to the effect that bridges having clearances over twenty-two feet were not so listed; as far as we know, every copy of that report that went out had all such bridges listed as clearances of twenty-two feet plus.

We have been criticised because in averaging bridges over twenty-two feet in height we did not take them at their true height, but at twenty-two feet. The purpose of offering this exhibit was to show the usual practice. There is in most every city a number of instances where very great clearances occur over railroad tracks; for instance, the Municipal Bridge in St. Louis will clear the tracks of the Oak Hill Railroad some sixty-five feet; it don't mean it was built sixty-five feet above the railroad track to give such a clearance. That bridge [fol. 866] was built sixty-five feet above high water in the Mississippi to provide clearance for river traffic that might occur.

It might have been proper for us not to list such bridges which did not represent any practice, but as they did not infringe upon

what is considered safe clearance, 22 feet, we listed all such structures and took them in our averages.

In Pittsburgh we found one bridge that cleared the tracks by 150 feet and another 100 feet; if we should have averaged such heights we would have had ridiculously high average clearances in Pittsburgh, which would not have meant anything. We used that rule when we found clearances less than the bridge itself. In Philadelphia we found thirty-four bridges, the actual clearance under which was 15 feet 2 inches, due to electrification, but as we were endeavoring to find the practice when the bridges were built, we took actual heights of bridges above tracks, which varied greatly, some being in excess of 22 feet. In all bridges listed there are more whose clearances are 18 feet or less than there are that exceed 18 feet.

Mr. Loweth of the Chicago, Milwaukee & St. Paul mentioned the depression of the H. & D. division of the Chicago, Milwaukee & St. Paul in Minneapolis; that is a complete depression of the track with an 18-foot clearance.

At Kingshighway at the east end of this project the clearance is 17 feet 3 inches; the next bridge east is 17 feet 1 inch; at the north end the St. Charles Rock Road Bridge, built in 1916, has 18 feet 3 inches clearance.

Q. What would you say as to grades proposed by the City's plan—[fol. 867] are they reasonable and proper, *by* otherwise?

A. The City's plan provides a profile having a maximum grade of eight-tenths of 1 per cent; the total extent of this grade is less than one mile; the Wabash tracks between Grand avenue and Ferguson have maximum grades of $1\frac{1}{2}$ per cent, with long stretches of 1 per cent grade, one being more than two miles long. That is clearly shown on this Exhibit No. 39, which shows profile of this same portion of the Wabash. The average grade shown on City's profile is five-tenths of 1 per cent; the average on this whole line from Grand avenue to Ferguson is .64 per cent. Grades proposed in City's plan are velocity grades; that is, in either direction the train runs down a hill and acquires momentum to be surrendered in passing up the hill on the other side; the grades in the Wabash profile are not compensated in any way; the train must climb this grade continuously of 1 per cent for a distance of two miles before passing over the summit; the same thing is true in passing the other direction. This is the ruling grade on this line.

Between Ferguson and Normandy the rise in the Wabash total plan is 202.67 feet, an average rise per mile of 19.7 feet. The fall in present Wabash line between Grand avenue and Ferguson is 146.56 feet, an average of 14.2 feet per mile; the average rise and fall through that distance is 16.95 feet; compared with those figures the rise in the City's plan is 47.64 feet, or 15.3 feet per mile; the fall in City's plan is 29.78 feet, or 10.1 feet per mile; the average rise and fall in the City's plan is 13.2 feet per mile, so that by every standard known of grade comparison the City's plan provides a [fol. 868] grade that is better than the present grade of the Wabash between Grand avenue and Ferguson.

Criticism has been made of the City's plan because it requires the starting of the westbound passenger trains at Delmar on a grade of .8 per cent. Every westbound Wabash passenger train that stops at Delmar also stops at Vandeventer station. By reference to City's Exhibit 94 it will be noted that a train of ten sixty-foot coaches standing at that station, with a rear coach on the bridge over Vandeventer avenue, would have its engine on a grade of 1.08 per cent and the coaches on an average grade of .86 per cent, a much worse condition than proposed at Delmar.

The Wabash has a number of suburban stations on grades of 1 per cent. The grade proposed at Delmar is not unusual or excessive. The union station at Washington, probably one of the finest in the world, has eleven of its twenty-nine tracks on a grade of .8255 per cent.

I submit plat showing profile of the Missouri Pacific and Frisco tracks at Tower Grove.

Said plat marked "City's Exhibit 156."

This shows the grade of the Missouri Pacific and Frisco tracks as they existed prior to the separation of grades at Tower Grove and as they exist today. The former profile of the Missouri Pacific tracks is shown by black dotted line; present profile shown by black solid line. Although every opportunity was present to improve grades of the Missouri Pacific tracks at that point, they adopted a grade of 1 per cent running eastwardly from Vandeventer Station, so every [fol. 869] eastbound Missouri Pacific passenger train that stops at Vandeventer Station has to start up a 1 per cent grade to go towards Union Station. The original tracks of the San Francisco Company are shown by white unmarked dotted lines, and present track by solid white lines. All eastbound trains on the Frisco must start on a grade of .75 per cent.

This Commission recently ordered a separation of grades between the tracks of the Oak Hill branch of the Missouri Pacific and the Frisco at Tower Grove. I submit plat showing proposed grades of the Oak Hill track running west from the Tower Grove Station to pass over the Frisco tracks.

Said plat marked "City's Exhibit 157."

Running westwardly from Tower Grove the tracks of the Oak Hill Railway Company will have a grade of 1.17 per cent, so that every westbound Oak Hill train will have to start up a grade of 1.17 per cent. There are more trains westbound on the Oak Hill today than on the Wabash at Vandeventer, and many more times eastbound on the Missouri Pacific at Tower Grove than there are westbound trains on the Wabash at Delmar.

Q. Have you given any thought to how the City's plan is going to affect the City of St. Louis?

A. Yes, I have. This plan will leave no grade crossings in Forest Park; it will make the railroad inconspicuous in the park; allow new entrances to be made to the park from the east; will preserve the present vistas along Union and Lindell boulevards.

I submit a picture looking westwardly along Lindell at the Wabash tracks.

Said picture marked "City's Exhibit 158."

[fol. 870] Lindell runs along the north side of Forest Park. The plan of the City will leave a clear view of Jefferson Memorial.

Said picture marked "City's Exhibit 159" shows a view looking southwardly toward Jefferson Memorial.

The City Plan Commission has under preparation at present plans for improving this vista in front of Jefferson Memorial.

The City's plan will improve conditions at Waterman and Hamilton avenues, as regards street grades it will preserve the value of real estate in that vicinity.

The plan here submitted has been the City's plan since first adopted in 1913, and all grades of the streets affected by it have been given with reference to it.

Houses were built at Lindell and Union high enough to conform with City's plan. A house has been built on Delmar since this hearing commenced which was kept high enough so it would not be damaged by change in grade.

These plans were accepted by officials of the Wabash in 1912. By referring to "the plan" I mean a plan of track depression with profile similar to that shown today. The plan at that time did not provide for relocation of tracks in Forest Park, but at a meeting before members of the Railroad Committee of the House of Delegates and City Council and members of the Board of Public Service of the City of St. Louis at which meeting the Mayor was present, also the Comptroller, Mr. Delano, president of the Wabash and the Receivers, Messrs. Bixby and Pryor, proposed that they should carry out a track depression plan, providing the City would pay consequential damages.

[fol. 871] Mr. Senti:

Q. What are the objections to the plan of the Wabash such as you have not heretofore stated. Are the plans of the Wabash heretofore submitted complete?

A. Plans submitted by the Railroad Company are various sketchy plans; no details have been furnished from which an estimate of cost could properly be made; no bridge details are shown on Maple avenue, or beyond.

Q. How does the cost of carrying out the City's entire plan compare with carrying out the entire plan proposed by the Wabash?

A. It will be necessary, in my judgment, to elevate the tracks all the way out to and over Page avenue in order to separate the grade crossings between city limits and Page avenue. The Wabash plans do not include the elevation of tracks northwardly beyond the city limits; they show a method of coming back to grade which will be rather impracticable.

Recess was taken.

L. R. BOWEN resumes:

Mr. Senti:

Q. Have you any photographs of the intersections of the streets at the Wabash Railroad north of the Delmar project?

A. I have here a picture, City's Exhibit 160, which shows a view looking east at Etzel and Wabash tracks. At this point the Wabash plan for raising the track is twelve feet; to get a fourteen-foot clearance that will require a depression of this street of about six feet.

City's Exhibit 160 marked.

[fol. 872] This is a picture at Plymouth avenue, looking eastwardly across Wabash tracks. Plymouth avenue is not indicated on the Wabash profile; the profile, however, indicates a rise of about six feet at this point.

Said picture marked "City's Exhibit 161."

This picture looking eastwardly along Page and across the Wabash Railroad tracks. Page at this point is 100 feet wide and is an important highway.

Said picture marked "City's Exhibit 162."

Q. Have you prepared any figures on the comparative cost of carrying out the Wabash and the City's plan?

A. Yes; we heretofore submitted in evidence estimates of the total cost of the City's plan. For a comparison with the estimates submitted for the Wabash plan of track elevation and to provide corrections in this estimate some changes must be made. There should be added for grading in the city, as brought out this morning, \$19,167; an error in adding cost of ballast in Mr. Pollock's estimate of \$11,000 should be added. Mr. Pollock stated he did not allow for changes in the United Railway's trestle just west of De Baliviere made necessary in order to carry a temporary track through that point. Plans were made for that work and our estimate of cost of those changes is \$2,000. The City's plan shows sod on the slopes of the railroad cut, but this sodding was omitted in the estimate prepared by Woerman Construction Company.

I offer this as City's Exhibit 163, an estimate prepared by that company amounting to \$24,920 for that work.

Marked "City's Exhibit 163."

[fol. 873] This will make a total addition, exclusive of the 10 per cent. of \$57,087. As the Wabash plans do not provide for three tracks from De Baliviere to Union, there should be deducted from the City's estimate of cost for comparative purposes for the third track amounting to \$89,844 70, making a net deduction of \$32,757.70, to which should be added 10 per cent for engineering and contingencies, making a gross deduction of \$36,033.47. This makes

total cost of City's plan, if carried out before the River des Peres is sewerred, \$2,176,148.17; after the River des Peres is sewerred, \$1,829,566.22.

The Wabash estimate for its temporary plan at Delmar and Hamilton amounted to \$670,093; adding their estimate for balance of work in accordance with its plan of \$1,678,196 makes total cost of their plan \$2,348,289. For comparative purposes with City's plan there should be deducted from this estimate the cost of industrial spurs, amounting to \$58,647.50, making total of Wabash plan \$2,289,641.50, or \$113,493.33 in excess of cost of City's plan if carried out in advance of construction of the River des Peres sewer, or \$460,075.28 more than the City's plan if carried out after the River des Peres sewer is constructed.

Paper marked "City's Exhibit 161" filed.

Q. Are any of the items in the Wabash estimate of the cost of the City's plan excessive in your opinion?

A. I think a number of them are. I call attention to the item "excavation." The Wabash unit price for excavation was \$1.75 per cubic yard. Cost to the Frisco Railroad of lowering tracks at Tower [fol. 874] Grove, that is cost of excavation, was 52.3 cents per cubic yard, and of that excavation there were 163,720 cubic yards. The work was done in 1913 and 1914. The grading was done by the forces of the Frisco Railroad Company. This was a very difficult piece of work and had to be done while very great traffic was being maintained. Part of the work had to be rehandled.

The cost to the Missouri Pacific for grading at Tower Grove was 69 cents per cubic yard, and they handled 75,000 cubic yards.

The Frisco Railroad Company has just let contracts for double-tracking between Windsor Springs and Valley Park. This work consists in cutting an open cut through a hill largely of rock immediately south of the present line between these points. In this excavation there are 129,800 cubic yards of earth. For this excavation the unit prices of the three lowest bidders varied from 31 to 42 cents. This work contained 87,700 cubic yards of loose-rock excavation. The unit prices of the three lowest bidders varied from 40 to 50 cents a yard for the loose-rock excavation. This work contained 167,400 cubic yards of solid rock, and the bids of the three lowest prices for solid rock excavation varied from 82 cents to 90 cents per cubic yard. Total cost that the Frisco will pay for the 384,900 cubic yards of excavation, which is 45,550 yards more than required for the City's plan, is \$221,978, as compared with the Wabash estimate of \$698,000 for the earth excavation in the City's plan. The contracts under which these bids were received have been let within the last seven days.

We wish to submit a tabulation as City's Exhibit 165, of quantities [fol. 875] ties going into the estimates of the City's plan as prepared by different contracts for the City and as prepared by the Wabash Company.

The City engineers made a separate estimate of the quantities for this entire work, which is shown on the second page of this

exhibit, and a comparison between the quantities estimated by the City engineers and the quantities estimated by the contractors employed to prepare estimates for the City is also shown on second page.

Paper marked "City's Exhibit 165."

Q. Why is the construction work on the City's plan cheaper than that under the Wabash plan?

A. There is less change in grade under the City's plan than under the Wabash plan; from city limits to Delmar the average change in grade of the Wabash plan is twenty feet, and the average change in grade by the City's plan is 8.7 feet. Between Delmar and De Baliviere the average change in the railroad's plan is 20.22, while the average in the City's plan is 10.9 feet. Between De Baliviere and Union the average change in the railroad's plan is 19.02 feet, while the City's average is 16.11 feet. Between Union and Kingshighway the average change in the railroad's plan is 7.79 feet, and in the City's plan 8.72 feet.

In measuring the change of grade in the City's plan between Union and Kingshighway the change is measured as between the subgrade of proposed profile and the average surface of the ground, as between those points the City's plan provides a new alignment of the railroad tracks.

The cost of widening out to four tracks under the City's plan [fol. 876] would be much cheaper than the cost of widening under track elevation plan; first, because there is less change in grade in the City's plan, and second, because all of the bridges in the City's plan that are built over the railroad tracks are planned to be built for four tracks at present, while according to the railroad's plan it would be necessary to widen out their bridges for four tracks.

I have procured and tabulated data from other cities as to the manner in which the costs have been apportioned between the railroads and municipalities in change of grade projects.

Said tabulation marked "City's Exhibit 166."

In the State of New York the cost was apportioned 50 per cent to the railroad 25 per cent to the state and 25 per cent to the city. According to Mr. Jas. B. Walker, secretary for the Commission for the First District, there has been appropriated by the state and the city respectively since \$1,097,186.50, which he states represents the total cost of work as \$4,388,746.

In Chicago, according to Mr. S. Gold, there was spent in grade elimination work a total of \$96,783,000 of which the city paid \$1,450,000 or a total of 1.5 per cent.

In Philadelphia, according to Mr. Jas. W. Phillips, Assistant Engineer in charge of grade separation work in the Bureau of Surveys, \$47,209,650 was spent, of which the city paid \$19,611,880 or 41.5 per cent.

In Detroit, according to Mr. Geo. Reed, Engineer of Grade Separation Work, there has — spent \$6,023,716, of which the city paid \$850,000 or 14.1 per cent.

In Cleveland, according to Mr. A. B. Cook, Engineer of Bridges [fol. 877] and Docks, there has been spent a total of \$8,050,000, of which the city paid \$2,817,500, or 35 per cent.

In Ohio the state law requires the railroad to pay 65 per cent of cost of grade separation work and the city 35 per cent.

In Boston, according to official table of expenditures for grade separation work published by that city, it shows that in a certain period it spent \$14,201,567.46 in grade separation work, of which the city paid \$2,346,663.33.

In Massachusetts the law requires the railroad to pay 65 per cent, the state 25 per cent and cities 10 per cent of grade-separation work.

In St. Louis there has been spent in the elimination of grade crossings \$1,556,920.14, of which the city has paid \$370,292.71 or 23.8 per cent of the cost.

In Buffalo, according to the report of the Chief Engineer of Grade Crossing Commission, there was paid in grade-separation work between 1888 and 1921 the sum of \$15,538,997.98, of which amount the city paid \$5,639,397.65 or 34.1 per cent of the cost.

The total of these amounts to a total cost of \$191,752,597.58, of which the cities have paid \$34,183,020.19 or 17.6 per cent.

Counting each city as a unit and averaging the per cents paid by the cities where the laws do not fix the percentages, and the percentages required by law to be paid where they are fixed, the average for the different cities is 23.1 per cent.

Tabulation of percentages marked "City's Exhibit 166." Copies of laws of states of New York, Ohio and Massachusetts, fixing per cent to be paid by states, cities and railroads respectively, marked "City's Exhibits 167, 168 and 169."

[fol. 878] We have made a tabulation showing amount contributed by the Wabash Railway Company to all bridges built over its tracks and estimates of cost of all bridges it has built over the City's streets.

Said tabulation marked "City's Exhibit 170."

This is the correspondence leading up to the letter heretofore introduced in evidence, in which the Chief Engineer of the Rock Island advised the City with regard to the proposed detour of the Rock Island trains over the Wabash tracks.

Correspondence with Rock Island R. R. marked "City's Exhibit 171."

Pictures along the Rock Island between De Baliviere and Skinker road, the first of which shows bridge over River des Peres, the second, a view looking eastwardly toward the bridge over the River des Peres, the third another view looking eastwardly toward bridge over the River des Peres, are offered in evidence.

Said pictures "City's Exhibit 172."

At a previous hearing in this case, under cross-examination, I was asked if we had discussed the rerouting of the Rock Island trains so they would miss the City of Clayton and I stated that there was

no City of Clayton. I did not know at that time that Clayton had succeeded in its efforts to be an incorporated city and should not have made that statement. I wish to correct that statement and say that since that time we have taken up with the City of Clayton the proposition of having the Rock Island trains rerouted so that there would be no passenger stops at the City of Clayton.

[fol. 879] I offer this resolution which was adopted by the Board of Aldermen of that city, pursuant to a public hearing on that question.

Resolution adopted by Board of Aldermen at Clayton on the subject of detouring the Rock Island offered and marked "City's Exhibit 173."

City's Exhibit 135 consists of two pictures; on the upper picture is shown the conditions of Union boulevard and Wabash tracks, the view is taken looking northwardly. The lower picture shows a view at the same point on which picture there has been drawn the bridge shown in plans of Wabash Railway for track elevation.

City's Exhibit 136 is a view looking northwardly across Wabash tracks at Waterman avenue.

City's Exhibit 137 contains 2 pictures identical with pictures 136, on the upper has been drawn a view showing how the City's plans, if carried out, would look at that point and the lower how the bridge proposed to be constructed by the Wabash Railway Company would appear at the same point.

City's Exhibit 138 is a view looking northwardly along Kingsbury and Hamilton where they cross the Wabash tracks.

City's Exhibit 139 shows two copies of the same picture; the upper of which has been drawn showing how the same situation would appear if the City's plans are carried out and the lower showing how the same situation would appear if the railroad plans are carried out.

[fol. 880] Recross-examination by Mr. Hall:

Q. Do you present this letter from the City Clerk of the City of Clayton as a final determination of the question that the Rock Island Railroad can abandon its passenger train service into the City of Clayton?

A. We offer that only as a resolution passed by the Board of Aldermen of the City of Clayton for whatever value it is worth. I assume this Commission would probably not take any action that would result in the abandonment of passenger train service in the City of Clayton without giving the people of that city some opportunity to be heard on that subject before this Commission.

Mr. Burns:

Q. It says in your Exhibit 173: "It being expressly understood that the present freight service from the west will be continued to the present sidings in the City of Clayton and as far east as Forsythe Boulevard." That contemplates running a branch line for freight

service in and out of Clayton even if the passenger service is abandoned through there?

A. Yes; that is the plan discussed with your Chief Engineer.

Q. So the Rock Island would be placed in the attitude of running a branch line freight service in and out of Clayton notwithstanding anything that might be done if the Commission would give consent to the abandonment of passenger service; is that true?

A. Yes, sir.

Q. Your Exhibit 155 referred to by you shows the contour of the ground north of Lindell between Union and De Baliviere?

A. Yes, sir.

Q. And this does show north of the Wabash tracks the right of way of the Rock Island here that is between those points between [fol. 881] De Baliviere and Union, for which you have made no provision in your plans whatever and have simply put the Rock Island out of business by taking the right of way out and making no provisions for pay for it?

A. We haven't made any provisions for paying the Rock Island anything for the use of this right of way; the assumption is if the Wabash and the Rock Island are required to separate their grade crossings at that point they will do the natural, local thing, build enough tracks to accommodate their joint service and use it.

Q. In case the Wabash should refuse to give the Rock Island that privilege, you propose to take it anyhow?

A. In that case the Rock Island Railroad Company would have to build through on the elevated or depressed plan, whichever was adopted, and the same reasoning was evidently undertaken by the railroad engineers when they made their plans and showed only two tracks through the same territory, and they showed those two tracks exactly in the middle of the combined right of way, side slopes extending down over both rights of way.

The ground immediately adjacent to the River des Peres at Delmar is about six feet lower than the ground at Hamilton; the ground adjacent to the River des Peres in Forest Park is considerably lower than the ground adjacent to the Rock Island excepting at the point where the River des Peres passes under the Rock Island; along there the land is practically level. Page avenue is very much higher than any of the land in this vicinity.

Q. As a real engineering proposition, would it not be feasible to elevate the whole track through the depression and make a better [fol. 882] grade from a railroad operating standpoint than to still lower the grade by cutting into the ground under the City's plan? I refer to both the Wabash and the Rock Island.

A. The question of feasibility ought to take into consideration the question of cost and the resulting conditions both to the railroad and to the City, and with those elements of feasibility in mind I should say that the most natural thing to do would be the thing the City is proposing.

Q. Would you not say as an engineer, from a railroad standpoint, to get a better grade coming into St. Louis and going out of St.

Louis it would be better to elevate the tracks over this low place and make the connection than to further depress them and for all time fix a steeper grade to get in and out?

A. For the portion of track embraced in this grade separation project, the plan submitted by the Wabash Railway Company shows a better grade for the railroad tracks than the plan submitted by the City.

Q. That is true of the Rock Island in getting west of what you call Clayton Hill, by having an elevation through there over the River des Peres; is it not better to have a constant elevation through there than to depress it from Union to De Baliviere and raise it beyond?

A. For that particular stretch of track the elevation would be better for the railroad, but, as compared with the general extent to the railroad track, it don't mean anything.

Q. Do you consider it fair, from an engineering standpoint, to make a comparison of the City's plan and the grades proposed thereon with present grades of the Rock Island and Wabash which [fol. 883] could be changed by future plans if they saw fit to do so, whereas your plan would irrevocably fix upon the railroads a worse grade than they could otherwise get by elevating these tracks through there?

A. I do, because of the great improbability of the railroads ever improving that grade; for the Wabash to improve its grade between Ferguson and Page boulevard to get it just an eight-tenths per cent grade would involve a tremendous expense, much more, to my mind, than the traffic would ever warrant. The grade reduction, as I understand, is carried out on the portions of the main line where the full load of the freight train is carried, beyond the point where the trains are made up and sent out; all of this stretch of track in here is within the terminal of the City of St. Louis; the main Wabash trains, the long ones, are not made up and carried through this district at all, and, of course, the Rock Island is not carrying any freight trains through here at all. It has the right to do it if it sees fit to do it, but it has no yards or places where it could make up those long trains. The Rock Island owns no yards east of De Baliviere in the Mill Creek valley.

I heard Mr. Rorourke, superintendent of the Rock Island, state to the effect that you have been constantly figuring on elimination of grades wherever possible and that it was not beyond the possibilities that they would eventually cut down the hill at Clayton in order to make better grades.

Q. As the country grows and future developments take place, would you say it was proper to force upon the Rock Island Railroad a proposition here which would forever prevent it from doing a thing of that kind?

[fol. 884] A. I would, because the improbability of its ever being done is so easily apparent by an examination of the contours of the land in that vicinity. That is my opinion.

Q. Is it not a fact that if the elevation plan should be adopted as set forth by the Wabash, the grades would be at once materially

helped by that elevation across the River des Peres bottom or valley?

A. I stated that their plan gives a better grade than the City's plan.

Q. The City's plan has been gone ahead with regardless of the Rock Island on the assumption that the Rock Island would be eliminated from consideration at its present routing; is that true?

A. The plans prepared by the City have been gone over for a period of five or six years with the engineering department of the Rock Island Railroad Company; they have in their files five or six sets of plans of this kind, and the chief engineer of the Rock Island consulted with us about these plans time and time again, and in one of the letters which we submitted today voices his approval of the City's plan.

We made no estimates of separating the Rock Island grades.

Mr. Hall:

Q. You spoke this forenoon about the fact that work done by union labor was more expensive than when not so done; the City of St. Louis by ordinance is required to have all its work done by union labor, isn't it?

A. No, sir. There was an ordinance to the effect that on all contracts let by the City the contractor should pay the prevailing wage, but that created such trouble that that ordinance was repealed; I don't recall the date. There is no such ordinance at all at present.

[fol. 885] Q. You spoke about the fact that when the grade crossing question at Delmar was settled, there would be an immediate building up of property adjacent to the railroad along Delmar, so that as a result there would be no problem or difficulty caused by the sliding of the embankment to the side; a building would be erected to take care of that; that was your statement, was it not?

A. I didn't mean the building would be erected to take care of that; I meant when the buildings were erected they would take care of it.

Q. Do you know of any properties along Delmar, east of Hamilton, that are unimproved?

A. There probably are, a long distance east of Hamilton, but I don't recall any in the immediate neighborhood. Of course, property values along Delmar have very, very materially increased and the things that bring business will very materially increase it; in speaking of this property, I had in mind property as valuable as that in the neighborhood of Hamilton and Delmar.

Q. What is there that would make it so desirable to build up the property right along the railroad, or along Delmar adjacent to the Wabash, if the grade separation were settled?

A. I don't know that there is anything particular about it.

Q. Don't you know that business centers such as you find at Hamilton and Delmar are located at comparatively equal distances apart? Take it at Taylor and Delmar; there is a business section there, is there not? That extends as far as Kingshighway; then there are other residences between Kingshighway and Clara? At

Clara and Delmar there are a great many residences and apartments in there?

[fol. 886] A. Quite a hospital district along there. There is quite a variation for the property along there for other than commercial purposes. I don't recall much of the section between Clara and Hamilton; there are a couple of old residences in there; I think some of them have been torn down to make way for business property. There is quite a business center at De Baliviere and all the way from Hamilton to De Baliviere.

Q. My question was that from Hamilton the next business center west is at Skinker road and Delmar?

A. Yes; there is somewhat of a business center at Rosedale.

Mr. Haid:

Q. There are no residences along there except those above the stores, from the point west of the Wabash station to Rosedale?

A. No, sir; it is all business.

Mr. Hall:

Q. You presented some figures showing what some railroads had paid for excavation work back in 1913 or 1914, I believe, and then some prices that had been paid for contracts let for some work within the last week or so by railroads?

A. Yes, sir.

Q. You understood, did you not, Mr. Bowen, that the prices and estimates furnished by the Wabash and Rock Island were made with the intention that they should be comparable in point of time with the estimates that were furnished by the City when their estimates were submitted in this case?

A. Yes. In that particular regard Mr. Bowen testified that the estimate of \$1.75 a yard for excavation was based on actual jobs. The information we received from him since is that that actual job [fol. 887] was done over twenty years ago. That was the grading of the terminal tracks at Jefferson avenue, at the north end of the old Jefferson Avenue Viaduct.

Q. You introduced in evidence a letter from someone representing the De Mun tract owners, in which they offered to furnish the earth or dirt free of charge to the City; did you notice it required that the work of removing that dirt be begun by July 22, 1922, and completed within four months?

A. Yes.

Q. Did you apprehend that this project could reach the point where that earth could be available for filling Delmar boulevard within four months from July, 1922?

A. I thought it might; yes.

Q. In the letter you submitted from some — representing the owners of the Roeller tract, they said they would furnish a certain amount of dirt provided the work was done in the "near future"; what do you understand that to mean?

A. They didn't want to tie up their property indefinitely. You understand the City, in asking these people if it could grade off their property, had nothing to offer them; it couldn't offer them a contract or any immediate prospect of carrying out the work, and all these people that own large tracts of land hope to sell the land. They don't want it tied up in such a way that they couldn't dispose of it, and therefore they have naturally limited the time in making such permits.

Q. You spoke of the fact that all Wabash passenger trains which stop at Delmar stop at Vandeventer. Where did you get that information?

A. From the official Wabash time table for this district. I have a copy of it here if you care to see it.

I read from the report made by the Park Commissioners to the [fol. 888] County Court of St. Louis County. The law creating Forest Park required the Commissioners of Forest Park to make a report as of January 1 and July 1 of each year. The date of the report is January 1, 1876. We did not offer this in evidence; we only read a portion out of it.

Q. Did you notice this part of the report of the Commissioners dated January 1, 1876, with reference to the railroad in the park, under the heading "Railroad Matters," which reads as follows:

"The law establishing Forest Park contains the following provisions:

"Provided that nothing in this act contained shall prevent the St. Louis County Railroad Company from using and occupying a right of way of a width of seventy (70) feet through the northeastern portion of said Forest Park. The said railroad shall enter the park through Duncan's subdivision on the east side of said park, and running westwardly on the northern side of the River des Peres shall pass out of the said park at a point on the northern line thereof east of Union avenue; provided, further, that no switch or siding shall be constructed by said railroad company in said park, nor shall more than one depot be established in said park, and that shall be for passengers only; and, provided further that the grade of said railroad as far as the same runs through said Forest Park shall be approved by said park commissioners.

"The topography of said portion of the park through which the law authorizes the railroad to be built could scarcely have been in all respects more favorable to the necessities of the park at this, its point of principal approach.

"Its line through the park presents a grand and beautiful reverse [fol. 889] curve nearly 4,000 feet long, and enters from the directions of the city through a cut twenty-five feet deep, to be occupied by a tunnel 300 feet long. Over this the eastern boulevard of the park will pass, leaving the railroad entirely out of view, and reunite its northern and southern portions until it emerges from the cut, and an embankment increasing in elevation to twenty-five feet over the park road for vehicles, and there a viaduct of stone and iron is being built, and almost completed, rendering this entrance not only safe, but elegant and imposing."

Q. I notice in the transcript of testimony at the former hearing you gave some figures furnished by Colonel Perkins of the United Railways showing number of street cars passing over Delmar eastbound and westbound at the Wabash crossing. Did that information state what number of those cars were returning from the western terminus to the sheds at De Baliviere and which were not carrying passengers and would not receive passengers? Don't you know as a matter of fact that a very considerable percentage of cars that cross the Wabash tracks on Delmar are running empty?

A. No, I don't know.

E. R. KINSEY resumes:

Mr. Senti:

Q. I show you a letter which is a copy of one the Wabash Railroad offered as an exhibit. You will notice statement of the writer that he received certain information from you concerning the elevation project of the Wabash. Do you desire to make a statement in connection with that?

[fol. 890] A. I think this was not offered as an exhibit, but counsel for the Wabash read it into the record. I don't know why, unless it was under the misapprehension that the letter contained something indicating I had at one time leaned to the belief that an elevated project was feasible and permissible. I refer to letter which counsel Brown read, being a communication from Charles H. Dames, then Assistant City Counselor of the City of St. Louis, addressed to Mr. A. C. Cunningham, chief engineer of the Wabash, dated March 9, 1915. The only thing in that letter which through inadvertence might be interpreted as throwing any light on that would be in the lower part of first page, which I will read:

"I am told by Mr. Kinsey that the diverting of the waters of the River des Peres is involved if a depression scheme is considered. I am also informed that the drainage scheme is an enormous project and for that reason it would probably be best that an overhead plan be alone considered."

I call attention to the fact that Mr. Dames did not say I expressed that belief. The fact is, which I want to make plain, that I never at any time held or expressed that belief, and Mr. Dames knew very well that I have at all times been opposed to the elevation plan proposed by the railroads.

Mr. Hall: I would like to offer the act of the state Legislature, if the Commission please, approved March 24, 1874, entitled, "An Act to Establish Forest Park," etc., found in the Laws of Missouri 1874, at page 371.

[fol. 891] Mr. Hall: I desire to offer in evidence the copy of the Post-Dispatch of St. Louis, part one, so far as it contains on page 3, an article entitled "Kiel Outlines to Post-Dispatch Municipal Improvements He Considers Urgent and for Which he Thinks Bond

Issue Would Carry." Dated December 10, 1921, and particularly call attention to that part which is as follows:

"For one reason or another, the Mayor put aside a number of items which were voted on, but which failed to carry in the 1920 bond issue election."

Mr. Haid: That is a statement of the Post-Dispatch and not of the Mayor at all.

Mr. Hall (continuing):

"Some of these, such as the River des Peres improvement and the additional approach for the Free Bridge, the Mayor said should be excluded from bond issues in the immediate future, because, he said, there was so great public opposition to them that to include them would mean the defeat of other meritorious measures. He said he believed they should be carried in a bond issue, but said he did not believe they should be permitted to endanger other improvements."

"Wabash Exhibit No. 53" marked.

Mr. Hall: I offer in evidence part two of the same Post-Dispatch, dated December 13, 1921, so far as it contains an article on the first page or page 23, showing a picture of Delmar boulevard, August, 1915, at the time of the River des Peres flood and the article headed [fol. 892] "Elimination of the River des Peres Open Sewer Menace Recognized as an Immediate Essential Improvement," and particularly that part of the article which quotes Mayor Kiel, as follows:

"Mayor Kiel told a Post-Dispatch reporter that he was opposed to including the River des Peres scheme in any bond issue that might be decided upon.

"There is no question that the work should be done," the Mayor said, "but the opposition to it is so great that it would not be adopted and it would defeat the remainder of the program, just as it defeated many of the items in the bond issue voted on last year. I do not believe we should jeopardize the other important matters by including that."

Said paper was marked "Wabash Exhibit 54."

E. R. KINSEY resumes:

Mr. Hall:

Q. Do you know what the deficit of the City of St. Louis was at the close of the last fiscal year? It was \$1,500,000, was it not?

A. It was reported to be something in that vicinity, yes.

Q. Do you know of any funds that the City of St. Louis has that would be available for carrying out that portion of the City's plans involved in the grade separation in this case for the purpose of constructing that portion of the River des Peres sewer which is submitted as part of the City's plan?

Objected to by Mr. Haid; objection overruled.

A. The City has funds more than ample to cover this purpose if the Board of Estimates sees the wisdom of applying it to that purpose. [fol. 893] pose. The Board of Estimates allots some \$15,000,000 each year for various purposes; if it is deemed wise they might allot funds for this purpose. The Board of Estimates has the power to apportion the City's revenue for a given year to certain specific purposes. Even after the sale of bonds the funds would have to be apportioned under the authority of the Board of Estimates.

Defendants close their case.

George F. Haid, Oliver Senti, Attorneys for Complainant.

[fol. 894] STIPULATION RE EXHIBITS AND TESTIMONY

By stipulation of the parties to this proceeding, it is agreed that the exhibits in this case cannot be set out and printed in this record and that the original exhibits introduced at said hearing, and included in this bill of exceptions, may be taken and considered as a part of this printed record and in connection therewith.

The foregoing testimony and exhibits introduced, together with a record entry of the Commission, showing that its members, on the 14th day of April, 1922, had made a physical inspection of the Wabash crossing at Delmar Boulevard and the Wabash right of way, from the northern City Limits to Kingshighway and the right of way of the Chicago, Rock Island and Pacific Railroad Company from the intersection of its tracks with the Wabash to the Western City Limits, was all the evidence introduced in said cause.

ARGUMENT AND SUBMISSION

On the 17th day of January, 1923, oral argument of said cause was heard by the Commission and the case taken under advisement.

[fol. 895] REPORT AND ORDER OF THE COMMISSION — April 9, 1923

By the COMMISSION:

I. The Issues

On October 8, 1920, Henry W. Kiel, Mayor of the City of St. Louis, filed complaint with this Commission against the Wabash Railway Company and Rolla Wells, Receiver of the United Railways Company of St. Louis. Subsequently an amended complaint was filed by leave, making the Wabash Railway Company, the Chicago, Rock Island & Pacific Railroad Company, the City of St.

Louis, the Laeclde Gas Light Company, the Southwestern Bell Telephone Company, the Kinloch Telephone Company, the Union Electric Light and Power Company, Cupples Station, Light, Heat and Power Company, Rolla Wells, Receiver of the United Railways Company of St. Louis, and the United Railways Company of St. Louis, parties defendant.

Said amended complaint states, in substance, that the tracks of the Wabash Railway Company cross the Delmar Boulevard at grade; that such tracks are continually used by said company for the passage of trains, both freight and passenger, over and across Delmar Boulevard; that the tracks of the Chicago, Rock Island & Pacific Railroad Company connect with the tracks of the Wabash Railway [fol. 896] Company at a point near Union and Lindell boulevards in the City of St. Louis; that said connection is at grade, and that the plan and method of separation of grades at Delmar Boulevard of the tracks aforesaid will, in the very nature of things, affect the method and manner of any change of grade that may hereafter be ordered or made of the tracks of the Chicago, Rock Island & Pacific Railroad Company; that Delmar Boulevard is an open, public and much-traveled thoroughfare in the City of St. Louis; that the United Railways Company of St. Louis, through its Receiver, Rolla Wells, maintains and operates street cars for the carriage of passengers for hire over and along Delmar Boulevard at grade, and over and across the tracks of the Wabash Railway Company at grade; that the use of the thoroughfare by pedestrians and vehicles and the use of the tracks of the Wabash Railway Company for trains, and the use of the tracks of the United Railways Company of St. Louis by its receiver for street cars, all on the same grade, render this crossing unsafe and dangerous to travel along said highway and that a separation of said grades is practicable; and that the other defendants herein have wires, cables, conduits and pipes, along Delmar Boulevard, which are used for furnishing electric, telephone and gas service, and which may be affected by a separation of grades.

Wherefore, complainant prays that defendants be required to [fol. 897] answer charges herein, and that after due hearing and investigation, an order be made by this Commission commanding the Wabash Railway Company to separate the grades aforesaid by the construction of a substantial viaduct over its tracks for the travel of vehicles, pedestrians and street cars over Delmar Boulevard; that the defendants, United Railways Company of St. Louis and Rolla Wells, Receiver, be required and commanded to separate said grades by elevating the street railway tracks to and upon the grade of the roadway of the viaduct so to be erected over and above the tracks of the Wabash Railway Company; that the defendants, the Laeclde Gas Light Company, Southwestern Bell Telephone Company, Kinloch Telephone Company, Union Electric Light and Power Company, and Cupples Station, Light, Heat and Power Company, be required and commanded to adjust their poles, wires, pipes, conduits or other appliances to the elevation to which Delmar Boulevard and intersecting streets will be raised by reason of the construction of said viaduct; that the Commission prescribe the terms upon which such separation shall be made, and the proportion in which the ex-

pense of the alteration and abolition of such grade crossings shall be divided between the parties affected thereby, and that the Commission make such other and further orders as it may deem right and proper.

[fol. 898] In its answer, the defendant, Wabash Railway Company, admits that there is a connection between its tracks and the tracks of the Chicago, Rock Island & Pacific Railway Company near Union and Lindell Boulevards in the City of St. Louis; admits that its tracks cross Delmar Boulevard at grade; admits that its tracks and rails are laid at grade where the same intersect Delmar Boulevard; admits that such tracks are used for the passage of certain freight and passenger trains, but denies that such tracks are continually used; admits that Delmar Boulevard is an open, public and much-traveled thoroughfare in the City of St. Louis; admits that the United Railways Company through its receiver maintains and operates street cars, for the carriage of passengers for hire, along and over Delmar Boulevard at grade, the tracks of which, at said point, intersect and cross the tracks of this defendant at grade, but this defendant denies that the use of the thoroughfare by pedestrians and vehicles, and the use of the tracks by this defendant for its trains and the use of the tracks of the United Railways Company for its street cars, all on the same grade, renders said crossing unsafe or dangerous to travel along said highway, and further denies that a separation of said grade is practicable, and specifically denies that it is practicable to separate said grades by the construction of a viaduct on said Delmar Boulevard, and over the tracks of this defendant, for the travel of pedestrians and vehicles using Delmar Boulevard.

Further answering, the defendant, Wabash Railway Company, states in substance, that the separation of grades at Delmar Boulevard by means of the proposed viaduct is but a single part of one general plan heretofore prepared by the city for the separation of grades of all the streets and drives which cross the right of way and tracks of this defendant between the east line of Forest Park in the City of St. Louis and the northern limits of said city, a distance of about three miles, and said plans of said city constitute a complete and indivisible plan for the separation of the grade crossings here referred to and which the city proposes and has threatened from time to time to impose upon this defendant; that said complete plan of the city contemplates, among other things, (1) that the present grades of defendant's tracks at the point where they cross Delmar Boulevard shall remain as they now are and that a viaduct shall be constructed over said tracks for the purpose of carrying Delmar Boulevard upon said viaduct and over said tracks at said point of crossing; (2) that from Delmar Boulevard northwardly to the city limits the present roadbed of this defendant shall be elevated upon an earthen embankment to a height of approximately fifteen feet above the present grade of the roadbed and that the railroad tracks [fol. 900] shall be carried over the intersecting public streets and highways by means of bridges constructed in such streets or highways; (3) that south of Delmar Boulevard, between said boulevard

and the point where said railroad intersects the east line of Forest Park, the present grade of defendant's railroad is to be depressed by excavation into a ditch of varying depths, reaching at some points a maximum depth of twenty-five feet below the present grade of defendant's roadbed and extending said ditch or excavation into and through Forest Park in said city, and that within said limits the intersecting streets and drives are to be carried over the tracks of this defendant by means of overhead bridges; (4) that from the point where defendant's railroad intersects the east line of Forest Park to the point where defendant's railroad intersects the north line of Forest Park at Lindell Boulevard, said plan proposes unlawfully and forcibly to take from this defendant and deprive it of its right of way without compensation therefor, and to move its tracks and roadbed therefrom; (5) that from the point where defendant's railroad intersects the north line of Forest Park and the south line of Lindell Boulevard to a point on defendant's right of way north of Lindell Boulevard and west of Union Boulevard, said plan would unlawfully and wrongfully force and compel this defendant to vacate and abandon its present right of way without compensation [fol. 901] therefor and would unlawfully and wrongfully require this defendant to acquire another and different right of way for the operation of its railroad.

Defendant further states, in substance, that the matter of separating the grade crossings of defendant's right of way and tracks and the intersecting streets and drives between the east line of Forest Park and the northern city limits has been the subject of controversy between this defendant and the city for the past several years; and this defendant has always insisted that the proposed plan of said city requiring this defendant to depress its roadbed and tracks between Delmar Boulevard on the north and the east line of Forest Park on the south, and to abandon a part of its roadbed and right of way, as aforesaid, will wholly destroy that part of defendant's railroad, and constitutes a confiscation thereof, because of the exceptional physical conditions under which said work would have to be done and the conditions under which that part of defendant's railroad would have to be thereafter operated and maintained; that the city's plan will forever prevent this defendant from thereafter asserting its right and claim to accomplish the separation of such grade crossings, if and when the same shall lawfully be required, by means of elevating defendant's roadbed and tracks to such a height and in such manner as this Commission may hereafter require and approve. [fol. 902] "Further answering, this defendant says, that it has heretofore acquired its present right of way through Forest Park, now in the City of St. Louis, by purchase, transfer and assignment to it by its predecessor in title and interest, the St. Louis County Railroad Company; that said right of way was acquired by the said St. Louis County Railroad Company and is now held by this defendant under and by virtue of an Act of the General Assembly of the State of Missouri, approved March 25, 1874, entitled 'An Act to establish Forest Park' (Laws Missouri, 1874, p. 371). That said Act, among other things, provides that the grade of said

railroad so far as the same runs through Forest Park shall be approved by the Park Commissioners appointed and acting by virtue States, and it would be deprived of its property without due process the railroad of this defendant was constructed upon the said right of way through Forest Park the predecessors of this Company and the said Park Commissioners entered into a valid and binding agreement in writing fixing the location of said right of way and providing that this defendant's predecessors and its successors and assigns should have and enjoy all of the rights, privileges, immuni- [fol. 903] ties, franchises, improvements, and property set forth in said agreement continuously and forever, and that no material alterations or change should be permitted in said tracks without the consent of all the contracting parties thereto and said railroad was thereafter constructed upon said right of way through said park upon the grade approved by said Park Commissioners and agreed upon by the parties to said agreement and has ever since been operated and maintained on said right of way and at said grade, and neither this defendant nor its predecessor has ever consented to the material alteration and change proposed and required by the said plan of the City.

"And defendant says that the said right of way through said Forest Park was acquired by defendant's predecessor, the St. Louis County Railroad Company, and by the grantors of this defendant for a valuable consideration and the aforesaid Act of the General Assembly of the State of Missouri and the agreement between the predecessors of this defendant and Forest Park Commissioners as aforesaid constitute valid and binding contracts between the State of Missouri and this defendant and are valid and binding upon the [fol. 904] City of St. Louis. And defendant says that any order of this Commission requiring this defendant to change the present right of way or the present grade of its railroad, or any part thereof, as the same is now constructed and operated upon its said right of way through Forest Park will constitute a violation of the said contract rights of this defendant and impair the obligations of the contracts between the State of Missouri and this defendant and between the Commissioners of Forest Park and this defendant contrary to the provisions of Section 10 of Article I of the Constitution of the United States, and this defendant would thereby be deprived of valuable and lawful rights and privileges and its property would be thereby taken and damaged for public use without just compensation, in violation of Article II, Section 21 of the Constitution of the State of Missouri, and it would be deprived of its property without due process of law in violation of Article II, Section 30 of the Constitution of the State of Missouri, and would be denied the right of trial by a jury on its claim for compensation for its property so taken and damages contrary to Article XII, Section 4 of the Constitution of the State of Missouri, and would be deprived of its [fol. 905] property without due process of law and its property would be taken for public use without due compensation contrary to Article V of the Amendments to the Constitution of the United States, and it would be deprived of its property without due process

of law and would be denied the equal protection of the laws contrary to Article XIV, Section 1 of the Amendments to the Constitution of the United States.

“Further answering, this defendant says that under the provisions of said Act of the General Assembly of the State of Missouri, approved March 25, 1874, said Park Commissioners entered into a tripartite agreement, dated August 11, 1875, with said St. Louis County Railroad Company and the St. Louis, Kansas City & Northern Railway Company, the grantors and predecessors in title and interest of this defendant, by which it was agreed and provided that said St. Louis County Railroad Company should permit, under such reasonable regulations and terms as might be agreed upon, other railroads to use its right of way through Forest Park, and up to the terminus of its road at Union Station in the City of St. Louis, upon such terms and for such fair and equitable compensation to be paid [fol. 903] to it therefor as might be agreed upon by such companies; that the St. Louis, Kansas City & Colorado Railroad Company, which was the grantor and predecessor in title and interest of the defendant Chicago, Rock Island & Pacific Railway Company, under and by virtue of said tripartite agreement and a decree of the Circuit Court of the United States for the Eastern District of Missouri entered on December 13, 1886, was granted the right to use the right of way and tracks, sidetracks, switches, turn-outs, turn-tables, and other terminal facilities of this defendant and its predecessors in title between the north line of Forest Park and Eighteenth Street in the City of St. Louis at twenty-five hundred dollars (\$2,500.00) per month; and said decree further provided that the expense per annum of maintaining the said right of way and other property pending such joint use thereof, including all taxes, upon said property, should be borne by the said Wabash, St. Louis & Pacific Railway Company, the predecessor and grantor of this defendant, and the said St. Louis, Kansas City & Colorado Railroad Company in the proportion that the number of wheels each of said companies shall cause to be passed over the main tracks, or parts thereof, on [fol. 907] said right of way, per annum, bears to the total number of wheels that both of said companies shall cause to be passed over the same during each year pending the said period of such joint use, and that this expense shall be paid at the expiration of each year, that the said right of way and tracks thereon and other terminal facilities shall be maintained and kept in good repair by the Wabash, St. Louis & Pacific Railway Company. And the said decree further provided that said St. Louis, Kansas City & Colorado Railroad Company shall enjoy the equal use and benefit of said right of way, tracks, switches, side-tracks, turn-outs, turn-tables, and other terminal facilities with said Wabash, St. Louis & Pacific Railway Company or its said receivers, and the said Wabash, St. Louis & Pacific Railway Company and all persons claiming by, through, or under it, and their agents, servants, counsels, and employes were perpetually enjoined and restrained from in any manner refusing to permit the said intervener, the said St. Louis, Kansas City & Colorado Railroad Company, its successors or assigns, from using with its or their en-

gines and cars the said rights of way, tracks, switches, sidetracks, turn-outs, turn-tables, and other terminal facilities of said Wabash, [fol. 908] St. Louis & Pacific Railway Company between the north line of Forest Park and said Eighteenth Street, on the terms therein above set forth in said decree, in and for the transaction of its or their business and in the operation of its or their road. Said decree further provided that the said St. Louis, Kansas City & Colorado Railroad Company should have the right to make connection with this defendant's said predecessor at the north line of Forest Park and to use the said right of way, tracks, switches, sidetracks, turn-outs, turn-tables, and other terminal facilities of said Wabash, St. Louis & Pacific Railway Company, or anyone claiming by, through or under it, as to the same, between the north line of said park and said Eighteenth Street, on the terms, in the manner and subject to the regulations in said decree set forth in and for the transaction of the business and in operation of the road of said St. Louis, Kansas City & Colorado Railroad Company, its successors or assigns; that after the entering of said decree, said St. Louis, Kansas City & Colorado Railroad Company, the predecessor and grantor of defendant Chicago, Rock Island & Pacific Railway Company, entered into the use of this defendant's right of way, tracks, and facilities [fol. 909] from the north line of Forest Park to Eighteenth Street in the City of St. Louis as provided in and under the terms of said decree and has ever since and now is using this defendant's said right of way, tracks, and facilities and is paying this defendant for such use as provided in said decree; that said compensation so paid to this defendant is a valuable right which this defendant is entitled to receive and enjoy under the terms and provisions of said tripartite agreement and said decree of court. This defendant further states that the said plan of the City of St. Louis for the separation of grades at Delmar Boulevard will necessitate and require that at the point where the tracks of this defendant connect with the tracks of the defendant Chicago, Rock Island & Pacific Railway Company, the said company's tracks shall be sunk or depressed into a ditch approximately twenty-five (25) feet below the present level of said connection and will necessitate and require that said Chicago, Rock Island & Pacific Railway Company shall sink or depress its tracks west of the point of said connection; that a short distance west of said connection the tracks of the said Chicago, Rock Island and Pacific Railway Company cross over the River Des Peres, that it [fol. 910] would be impossible for the said Chicago, Rock Island & Pacific Railway Company to operate its railroad over said River Des Peres, and through the ditch or excavation and at the grade provided and required by the plan of said City and that as a result thereof said Chicago, Rock Island & Pacific Railway Company would be compelled to abandon, or greatly decrease the operation of its trains over its said track and upon the right of way of this defendant as it now does, and this defendant would thereby be deprived of valuable rights, privileges, and compensation which it now receives for such use of its right of way and tracks and its property would be thereby taken and damaged for public use without just compensation, in violation of Article II, section 21 of the Constitu-

tion of the State of Missouri, and would be deprived of its property without due process of law in violation of Article II, Section 30 of the Constitution of the State of Missouri, and would be denied the right of trial by a jury on its claim for compensation for its property so taken and damaged contrary to Article XII, Section 4 of the Constitution of the State of Missouri, and would be deprived of its property without due process of law and its property would [fol. 911] be taken for public use without due compensation contrary to Article V of the Amendment to the Constitution of the United States, and it would be deprived of its property without due process of law and would be denied the equal protection of the laws contrary to Article XIV, Section 1 of the Amendments to the Constitution of the United States.

"Wherefore this defendant asks that the amended complaint be dismissed."

The Chicago, Rock Island & Pacific Railway Company, designated as the Chicago, Rock Island & Pacific Railroad, in amended complaint herein, filed its motion to require portions of said complaint to be made more definite and certain, and states therein, in substance, that this defendant is informed and believes that the city's plan constitutes a complete and indivisible plan greatly and permanently affecting the rights and interests of this defendant, and this defendant therefore requests that the complaint be made to state how the proposed separation of grades at Delmar Boulevard will affect the method and manner of changing the grade of the tracks of this defendant in order that it may be informed as to the nature of the complaint against it and may properly and intelligently protect its rights and interests in the premises and make answer to said amended complaint.

[fol. 912] Complainant, Henry W. Kiel, in compliance with the above motion of the Chicago, Rock Island & Pacific Railway Company, filed a supplement to the amended complaint herein, which states, in substance, that if the grade crossing of the Wabash Railway at Delmar Boulevard is abolished in the manner prayed for in this complaint, any future order of this Commission to abolish the grade crossings of the Wabash Railway Company at or near Lindell Boulevard will necessitate the depression of the Wabash Railway tracks and right of way at Lindell Boulevard and will necessitate the depression of tracks and right of way of the Chicago, Rock Island & Pacific Railway Company at Lindell Boulevard and for some distance westwardly therefrom.

In its answer to the amended complaint and supplement thereto, the defendant, Chicago, Rock Island & Pacific Railway Company states, in part, its business consists largely of transporting large quantities of freight and large numbers of passengers and the United States mails from one state to another, and between the states over its lines of railway; that it is a common carrier for hire, devoting its said railway to the public use in transporting freight and passengers and mails of the United States from one place to another over its said railway; that the proposed action of the complainant herein, and the city of St. Louis in separating grades at Delmar

[fol. 913] Boulevard in St. Louis would necessarily result in subsequently requiring this defendant to depress its tracks and railway between De Baliviere Avenue and Union Boulevard in the City of St. Louis in order to continue the use of its railway over the tracks of the Wabash Railway Company from the north line of Forest Park to the Union Station, creating an intolerable burden in operating conditions and subjecting its said railway to floods from the Des Peres river, and would be a direct, unreasonable, arbitrary, unlawful and unwarranted interference with the railroad and property of this defendant, and with the interstate business of this defendant, and that it would endanger and interfere with the operations of its trains between St. Louis and points in Kansas, Colorado, Oklahoma, Texas and other states and to Pacific Coast points, which trains are operated and maintained primarily for the purpose of transporting the interstate traffic of passengers and property and the carriage of United States mails, and that the operation of this defendant's railway would be greatly impeded and impaired, and the expense of such operation would be greatly increased without any benefit to the public, and that such action of the complainant would thereby cast a direct burden upon interstate commerce.

In general, the balance of the answer of the defendant, Chicago, [fol. 911] Rock Island & Pacific Railway Company, is the same as that filed by the defendant, Wabash Railway Company, *supra*.

The answer of Rolla Wells, receiver of the United Railways Company of St. Louis, in substance, denies that the conditions surrounding the crossing of Delmar Boulevard with the tracks of the Wabash Railway Company are such as to render said crossing unusually unsafe and dangerous; and said defendant therefore prays that the complaint be dismissed.

The Laeche Gas Light Company formally acknowledges receipt of summons herein, and entered its appearance in writing.

The defendant, Southwestern Bell Telephone Company, in its answer states, in substance, that it is not advised as to the necessity for the construction of a viaduct at the Wabash tracks on Delmar Boulevard in the City of St. Louis, nor whether said plan is feasible, or necessary at this time; that if any such plan as that outlined in the amended complaint is carried out, it will be very expensive for this defendant and will cost a large sum of money, estimated by its engineers to be somewhere between \$75,000 and \$100,000; that it has a right to have its construction in its present location; that it is thoroughly satisfied with said present location, and that the moving of said construction will not add anything to the safety or convenience of its conduits, cables and other construction used in the giving of service to its patrons; that there is such a great demand for [fol. 915] telephone service at the present time throughout the entire territory in which this defendant is operating that it is in many places practically impossible to furnish all the service that is required; that because of the financial condition in the country it is difficult to obtain the necessary funds with which to make necessary additions to its property to serve the people who are demanding telephone service, and that to compel this defendant to spend \$75,000

to \$100,000 additional at this time for work which is not essential in so far as the interests of the telephone users of the City of St. Louis are concerned, would be to still further handicap this company in rendering telephone service in the State of Missouri; and that this defendant further suggests to the Commission that should any order be made herein, proper provision should be made to take care of the construction of this defendant, both, temporary and permanent, in any change that is ordered, and that should a viaduct be erected as asked for by the City of St. Louis, that space on said viaduct to carry all present and future construction of this defendant be provided for without additional charge to this defendant.

The defendant, Kinloch Telephone Company, in its answer states, that to its knowledge it has no poles, wires or other equipment on Delmar Boulevard in the City of St. Louis, at the intersection of the [fol. 916] Wabash tracks, and, therefore, is not interested in the matters contained in said petition.

The defendant, City of St. Louis, for its answer says that it admits the averments in the complaint herein, and prays the Commission to order the separation of grades therein described by an appropriate order directing the separation of the grades at said point by elevating Delmar Boulevard over and above the tracks of said Wabash Railway Company, and that the Street Railways Company, and other utilities be required to adjust themselves to the new grade of Delmar Boulevard that may be established by such order.

Hearings were held at St. Louis before three members of the Commission on February 21 and 23, 1921; and on March 23, 24 and 25, 1921. Hearings were also held at Jefferson City before two members of the Commission on February 6 and 7, 1922, and on March 14 and 15, 1922.

II. The Facts

(1) The Necessity for Grade Separation at Delmar Boulevard.

The Commission is here concerned with the decision of the case as presented by the complaint herein, which is whether the grades at the crossing of Delmar Boulevard and the tracks of the Wabash Railway Company should be separated, and if so, in what manner, [fol. 917] and the apportionment of the costs thereof between the parties.

The Commission does not undertake in this case to pass upon the complete plan of the city for the separation of grades at all crossings or the many objections raised thereto by the defendants.

A separation of grades at Delmar Boulevard by raising the street over the railroad tracks makes it imperative that the separation of grades at other street crossings over the railroad tracks between the Delmar crossing and Kingshighway should be by elevating the streets and depressing the railroad tracks, yet we should and will leave the details of the plans for that work to be settled when the

issue arises in a preceeding or preceedings to be had for such purposes.

A large volume of testimony in the form of exhibits and oral evidence was submitted in behalf of complainant and defendant railroad companies. The same parties submitted printed briefs and oral arguments.

The testimony in the case took a wide range. The complainant presented plans for the separation of grades at Delmar Boulevard by raising the street over the railroad tracks of the Wabash Railway Company. The said railway company offered a plan for raising the railroad tracks above the street at Delmar Boulevard and took the position that if the street or tracks were raised at Delmar Boulevard [fol. 918] yard the same must be done at all other street crossings south of Delmar Boulevard to Kingshighway. It is conceded that if the grades are separated by raising the street over the tracks at the crossing at Delmar Boulevard that grade separation at other street crossing over the defendant's tracks as far south as Kingshighway must be accomplished by raising the streets and depressing the railroad tracks.

To show that it was practicable to place the streets above the railroads at all crossings within that district, the complainant offered in evidence a plan for so separating the grades at street crossings throughout that district. The defendant railroad companies offered plans for separating the grades at the crossings in said entire district by raising the railroad tracks above the streets and leaving the streets as now established.

The defendant, Chicago, Rock Island & Pacific Railway Company, will not be affected by a separation of the grades at Delmar Boulevard of the street and the tracks of the Wabash Railway Company. The tracks of the Rock Island Company are south of Delmar Boulevard. The Rock Island Company is interested herein only as the manner of separating the grades at Delmar Boulevard will control the method of separating the grades at crossings south of Delmar Boulevard where its tracks are located and where it uses the tracks of its co-defendant.

[fol. 919] The double tracks of the Wabash Railroad run westwardly from Mill Creek Valley, the railroad center of St. Louis, and pass under Kingshighway Boulevard through a tunnel with a clearance of 17 feet 3 inches. Kingshighway Boulevard is the eastern boundary of Forest Park. Emerging from the tunnel, the tracks turn sharply to the north and run for some distance approximately on the natural surface of the park, where they cross at grade an important pedestrian entrance to Forest Park. Continuing to the northwest across the park the tracks run on an embankment crossing Grand Drive overhead, and finally emerge from the park at its northern boundary, where they cross Lindell Boulevard at grade. Lindell Boulevard is the northern boundary of Forest Park for a length of about two miles, and its grades are such that the view is unobstructed for its entire length along the park. A short distance beyond where the tracks cross Lindell Boulevard they cross Union Boulevard at grade. Union Boulevard is 100 feet wide at this point.

After crossing Union Boulevard the railroad turns westwardly, still running through a high-class residential section. It crosses at grade De Baliviere Avenue, which is 100 feet wide and which carries a great volume of traffic southwardly to the park, which it enters at about the middle of its north side immediately in front of the Jefferson Memorial Building.

[fol. 920] From De Baliviere Avenue the tracks curve to the northwest, continuing through a high-class residence section and cross at grade successively Waterman Avenue, Hamilton Avenue and Delmar Boulevard.

After crossing Delmar Boulevard the tracks continue almost due north, crossing Olive Street Road at grade in the city, and Maple, Bartmer, Etzel Plymouth and Page Avenues at grade in St. Louis county. Between Delmar Boulevard and Olive Street Road there is a residence district on the east side of the railroad (from which it is separated by Holliamont Avenue), and an industrial district borders the railroad on the west side. North of Olive Street Road the industrial district extends along both sides of the railroad.

The Wabash tracks cross Delmar Boulevard at grade. This grade crossing is protected twenty four hours daily by crossing gates.

Delmar Boulevard is an important east and west thoroughfare, one hundred feet in width. Delmar Station is located immediately north of Delmar Boulevard and west of the Wabash tracks. Passenger trains between St. Louis, Chicago, Kansas City and other points, numbering fifteen daily stop at Delmar Station. Approximately six freight trains pass over the Delmar crossing daily.

[fol. 921] On October 11, 13, 14, 15, 16 and 18, 1920, traffic counts, made by the city, show an average traffic over the Wabash tracks at Delmar Boulevard of more than one thousand pedestrians, approximately two hundred wagons, about six thousand automobiles, and one thousand one hundred street cars, during the sixteen-hour period from 7.00 a. m. to 11.00 p. m. Evidence introduced by the city shows a 25 per cent annual increase in automobile traffic in St. Louis during the last few years. The traffic report of the United Railways Company (City's Exhibit No. 10) shows that 43,488 street cars passed over the crossing during October, 1920, or an average of 1,400 cars per day. It was estimated that these cars carried an average of 33,000 persons daily over the Delmar crossing.

Fire engines from four of the city's fire engine houses must at times cross the Wabash tracks at Delmar Boulevard in responding to fire alarms. There are no fire stations in the city west of the Wabash tracks. The record shows that one engine company which had occasion to go over the Wabash tracks at Delmar Boulevard thirty-eight times during one year was delayed twice by trains, two minutes each time, in responding to alarms; and met with three delays of two minutes each, from the same cause, when returning from fires. These delays are characterized as serious by the Chief of the St. Louis Fire Department.

[fol. 922] The City claims that development of property in the vicinity has been retarded by the grade crossing at Delmar Boulevard; and has resulted in loss to the owners of said property and to the City.

In August, 1919, a street car containing 35 or 40 passengers became stalled on the crossing shortly before a train was due, and before it was time to lower the gates. Before the street car could be moved, the train was heard approaching. A police officer ran down the tracks and flagged the train, which slowed down and had about stopped before striking the car, pushing it aside. A number of persons were injured, one of whom died some months later. A dentist testified that he narrowly missed being struck by an extra freight train which passed over the crossing while the gates were up. The watchman claims that he received no notice that an extra train was coming, and consequently he did not lower the gates. There have been twenty-five minor accidents at the Delmar crossing within the last five years sufficiently important to get into the police records.

(2) The City's Plan for Grade Separation at Delmar Boulevard

The City's plan for the elimination of the grade crossing at Delmar Boulevard provides for carrying said boulevard above the Wabash tracks on a viaduct, and adjusting the intersecting streets to the new grade of Delmar Boulevard. Said plan provides for a reinforced [fol. 923] concrete viaduct 100 feet in width, spanning a space in the street 77 feet long with a single line of supporting columns in the middle of the Wabash right of way. This 77-foot opening will provide space for a four-track railway. The plan provides for a vertical clearance of 18 feet from the top of rail to the under side of the viaduct. The approaches to the viaduct are earth embankments with retaining walls wherever necessary. The grades on the approaches to the viaduct are two and one-half per cent. The plan also provides for the construction of a concrete culvert of sufficient length to carry the west approach to the viaduct across the River Des Peres.

The City does not claim that the construction of this culvert will prevent water from the River Des Peres from again reaching the Wabash tracks should there be a recurrence of as great a flood as that of August, 1915. It is claimed, however, that the flood conditions will not be any worse.

The City presented an estimate of construction cost for a viaduct at Delmar Boulevard, prepared by its engineers, amounting to \$446,900.00, and an independent estimate, prepared by a contractor, amounting, with additions for water mains, engineering and contingencies, to \$476,390.20. The City also presented an estimate of the net amount of damage to property, caused by the changes in street grades, in the amount of \$61,756.79. Adding the net damages [fol. 924] of \$61,756.79 to the above construction costs, gives \$528,656.79 and \$538,146.99 as the total cost of the Delmar Boulevard grade separation project based on the City's and the contractor's estimates, respectively.

The Wabash Railway Company submitted an estimate of \$958,020 for the same work, built in accordance with the City's plan. The City takes exception to the inclusion of certain items in the Wabash estimate, as follows:

Item No. 1 of the summary is a figure of \$57,300 for "Temporary

Relocation of Delmar Boulevard." The City claims that the temporary relocation of Delmar Boulevard as proposed is impossible, and if possible is neither necessary nor desirable; and therefore contends that this item of \$57,300 should be eliminated from the estimate.

Item No. 2 is \$184,900 for "Legal Expenses and Property Damages." The City contends that this amount should be reduced \$123,143.21 to \$61,756.79, the amount of the City's estimate, for the reason that the Wabash Railway Company did not submit the details of its estimate, and for the reason that no one who had any knowledge of real estate values testified in defense of said estimate.

Item No. 3 is \$137,300 for "Embankment." This is itemized as 121,786 cubic yards at \$1.10 per cubic yard. The City contends that 70 cents per cubic yard is more than ample; and therefore the [fol. 925] sum of \$50,000 should be deducted from the Wabash estimate.

Item No. 4 is \$30,000 for "Borrow Pit." The City contends that this item should be eliminated from the estimate for the reason that no details were submitted with reference to area or location of said borrow pit; and for the further reason that there is much available land that needs grading down to make it usable.

Item No. 13 is \$55,000 for "Telephone Company's Expense." The City contends that this item should be eliminated from the estimate for the reason that when street grades are changed in St. Louis the utility companies must adjust their facilities to the new grades at their own expense; and directs attention to the fact that \$23,000 is the revised estimate submitted by the telephone company for adjusting its facilities to the proposed grade.

Item No. 14 is \$31,000 for "United Railways Expense." This item the City contends should be eliminated for the reason that the United Railways Company, like other public utilities, must adjust its facilities to whatever grades the City may establish.

The total of these amounts which the City claims should be deducted from the Wabash estimate is approximately \$346,500, without including 5 per cent for engineering, amounting to \$17,325, [fol. 926] that was added. These amounts, when deducted from the Wabash estimate, reduce it to \$594,195. The City claims that this amount should be reduced \$30,977 to \$563,218, because of the inclusion of what the City claims to be an excessive allowance for engineering and contingencies in the Wabash estimate.

(3) Wabash Plan for Grade Separation at Delmar Boulevard.

The Wabash presented its "Temporary Plan" for the elimination of the grade crossing at Delmar Boulevard by elevating its tracks about 21 feet at Delmar Boulevard and about 22 feet at Hamilton Avenue. This plan provides for temporary "runoffs" on one per cent grades, the northern approach beginning about Olive Street Road and the eastern approach about De Baliviere Avenue.

The City's objection to this plan is that it would forever preclude the elimination of the Wabash grade crossings south of Delmar Boulevard by any method other than track elevation. The City

contends that this method of grade crossing elimination would obstruct the view and mar the beauty of Forest Park and seriously decrease the value of real estate in one of the most splendid residence districts in St. Louis.

The City also objects to the Wabash plan providing for the location [fol. 927] of bridge supports in Delmar Boulevard; and claims that such supports would be dangerous to traffic on the street.

The City objects to the Wabash plan for the reason that it proposes to perpetuate the sump at the Hamilton Avenue crossing; and objects to plan for a temporary crossing at Waterman Avenue over the temporary eastern runoff of the tracks elevated to pass over Hamilton Avenue and Delmar Boulevard.

The City claims that the railroad embankment which the Wabash proposes to build south and east of Delmar Boulevard will cause the water at Delmar to rise higher than it did during the flood of 1915, and would make flood conditions much worse than they were in 1915, both for the railroad and for the City.

The Wabash estimate of its plan for the elimination of grade crossings at Delmar Boulevard and Hamilton Avenue is \$670,093. This exceeds the City's estimate of cost of eliminating the Delmar crossing, by means of a viaduct, by \$131,946; but is \$287,927 less than the Wabash estimate of the cost of eliminating the Delmar crossing in accordance with the City plan.

(4) The City's Complete Grade Separation Plan.

Briefly, the City's complete grade separation plan provides for the depression of the Wabash right of way and tracks from Kingshighway [fol. 928] way, on the east, to Delmar Boulevard, on the north and west. The plan provides for a foot bridge over the tracks in Forest Park, a viaduct over the tracks in Forest Park, viaducts over the tracks at the intersection of Union and Lindell Boulevards, at De Baliviere Avenue, at Waterman Avenue, at Hamilton Avenue, and at Delmar Boulevard.

The present elevation of right of way and tracks at Delmar Boulevard for the elevation of the Wabash right of way and tracks to the northward is not changed. North of Delmar Boulevard, the plan provides for city limits and beyond to a point near Etzel Avenue in St. Louis county. The plan provides for subways at Olive Street Road and Maple Avenue.

The City plan also provides for a change in the location of the Wabash tracks in Forest Park between Kingshighway and Union and Lindell Boulevards by moving the Wabash right of way about 50 feet south of its present location until it approaches Lindell Boulevard, where it is to be moved about 150 feet south so as cross the intersection of Union and Lindell Boulevards.

This plan provides that all viaducts to be built over the Wabash tracks shall have a minimum clearance of 18 feet above the top of rail. The City admits that this clearance is not sufficient to permit a trainman to safely stand on top of a box car. The provision of [fol. 929] Section 1047 of the Revised Code of the City of St. Louis

makes it unlawful for a railroad company to operate trains within the city without having a man on top of the cars.

The proposed viaducts over the tracks are all located between the bridge at Kingshighway in St. Louis, which has a vertical clearance of 17 feet 3 inches, and the bridge over the Wabash tracks at St. Charles Road, which has a vertical clearance of 18 feet 3 inches. The evidence shows that 18 feet is ample to clear the highest locomotive or car in the United States.

The testimony in support of the City plan was largely furnished by L. R. Bowen, engineer of bridges and buildings for the City; by E. R. Kinsey, president of the Board of Public Service, and by W. W. Horner, chief engineer of streets and pavements for the City.

Comparing existing grades with grades provided for in the City plan, attorneys for the City state, in their brief, that a study of the City's Exhibit No. 39 shows:

"Running west from Grand Avenue the Wabash tracks climb a grade in excess of one per cent to their station at Vandeventer Avenue; running west from Vandeventer Station they climb a one per cent grade and then lesser grades to a point east of Euclid Avenue, [fol. 930] whence they descend with an 0.8 per cent grade to Kingshighway; after climbing up to the bridge over Grand Drive they descend with a grade in excess of one per cent to Union Avenue; between Union Avenue and the city limits they run on easy grades, the best in this entire ten and one-half miles of track; from Delmar north they rise for three and one-half miles, reach a summit 136 feet above Delmar, then descend 115 feet in a little over two miles to Ferguson. Approaching the summit is more than a mile of one per cent grade; at the summit is more than 2,000 feet of 1.2 per cent grade; between the summit and Ferguson is two miles of one per cent grade and a stretch of 1.5 per cent grade. Near the summit the tracks lie in a long cut 56 feet deep, making any material grade reduction wholly impracticable."

Said brief states further:

"In contrast with these existing grades the City's plan proposes grades which reach a maximum of only 0.8 per cent and that in only two places, one between Kingshighway and Union, where 400 feet of 0.8 per cent grade is shown, and the other between Waterman and Maple, where 4,850 feet (less than a mile) of 0.8 per cent grade is proposed.

[fol. 931] "The maximum grades on this section of the Wabash Railroad do not occur in such relation with each other as to offer assistance to the trains climbing the grades. Every train that passes between Ferguson and Delmar Boulevard in either direction must climb on one per cent grades to the summit of a hill more than 115 feet high without the assistance of momentum acquired from other grades. In other words, they must climb uphill before going downhill.

"On the other hand, the profile proposed by the City is such that trains in either direction, before having to climb any grades whatever, must first run downgrade and will thus acquire momentum

to be used in climbing the ascending grades. The virtual grade of the City's plan is, therefore, much less than the actual grade."

The Wabash right of way from Delmar to De Baliviere is fifty-six feet wide. Between De Baliviere and Union it is sixty feet wide, except that from the point where it curves to the southeast until it reaches Union its width is reduced to fifty-five feet. Its right of way through Forest Park to Kingshighway is forty-two feet wide.

In order to provide for the most economical method of depressing the Wabash tracks from Delmar to De Baliviere Avenue, the City [fol. 932] has acquired at a cost of about \$25,000 the fee-simple title to two strips of land twenty-two feet wide extending along the Wabash right of way between Delmar and De Baliviere. These strips, together with a small triangular piece still to be acquired, when added to the present right of way will give the Wabash a right of way 100 feet wide from Delmar to De Baliviere Avenue.

The Chicago, Rock Island & Pacific Railway Company owns a right of way forty feet wide along the north side of the Wabash between DeBaliviere and Union, making with the Wabash right of way a combined right of way 100 feet wide, except near Union Boulevard.

Just west of Union Boulevard, it will be necessary to acquire additional land to provide for changing the alignment of the railroad tracks so they will cross the intersection of Lindell and Union Boulevards. This additional land, for which the City now holds an option, will make the right of way just west of Union wider than 100 feet.

With these additions there will be right of way provided between Forest Park and Delmar Boulevard with a minimum width of 100 feet, which will furnish ample space for a four-track railroad.

The City plan provides for the reproduction of the new grade of existing facilities, but makes provision for expanding to four tracks. [fol. 933] This plan provides that all bridges over the tracks, including those in Forest Park, be designed for four tracks.

The River Des Peres crosses Delmar Boulevard a short distance west of the Wabash tracks. On August 20, 1915, this river overflowed its banks, and water rose to a depth of about four and one-half feet at Delmar and the Wabash tracks. This flood did considerable damage to railroad and other property. The evidence shows that more than 30 per cent of the flood waters of the River Des Peres was carried by the Wabash cut south of Delmar Boulevard.

Mr. W. T. Catterton, the Delmar station agent, testified that during the flood of August 20, 1915, the water reached a depth of 3 feet 6 inches above the depot floor; that the water reached a depth of about 4½ feet above the tracks; and that the flood put the Wabash out of commission from 7:30 on Friday morning until 2:15 Sunday afternoon following.

The City claims that the probability of the recurrence of a storm such as that which caused the flood of August 20, 1915, is very remote. However, the City submitted plans for the control of the River Des Peres; and states that it has not asked that the Wabash

tracks be depressed unless and until these plans have been carried out and the River Des Peres placed under full control. These plans, in general, provide for an underground channel for the River Des [fol. 934] Peres, which will have a capacity sufficient to carry a flood 30 per cent greater than the flood of August 20, 1915.

In the event of delay in carrying out its plans for the complete control of the River Des Peres, the City claims that its plans of grade separation, which provides for depressing the Wabash tracks south of Delmar, can be carried out in advance of the construction of the River Des Peres sewer, and still have perfect security against storm or flood waters.

Mr. W. W. Horner, chief engineer of streets and pavements for the City of St. Louis, testified, in substance, that all existing sewers can be adapted to the proposed track depression; that said depression plan will require alterations in existing sewers adjacent to the Wabash tracks, consisting of the lowering of the arch of the Blackstone sewer in Union Boulevard about five feet at a cost of about \$41,000, the lowering of the 20-inch cast-iron main which comes from the pumps to the foul water sewer near Lindell, where it crosses the proposed depression east of Union at an estimated cost of \$1,265; replacing present sewer crossing the Wabash tracks at alley north of Kingsbury with cast-iron pipe at an estimated cost of \$780, and the reconstruction of the present foul-water sewer in the alley south of Pershing Avenue from the Wabash right of way to Des Peres Avenue at an estimated cost of \$9,954; that the estimated cost of drainage [fol. 935] lies in the proposed depression between Kingshighway and Delmar Boulevard is \$59,248 exclusive of a piece on the north line of Delmar which will cost about \$3,300; that the City plan provides for a 42-inch sewer from the proposed depression across Forest Park to Tamm Avenue at an estimated cost of \$347,060.85.

The City's complete plan of grade separation provides for the elevation of Delmar Boulevard across the path of the River Des Peres and the construction of a wall and an embankment on the west side of the Wabash right of way, joining the Delmar embankment at a point between the railroad and the river and extending northwardly until it merges into the embankment required for elevating the tracks north of Delmar. The elevation of the lowest point in these walls and embankments is 84 feet or ten feet higher than Delmar Boulevard.

In the event that track depression should be ordered before the River Des Peres permanent sewer is built, the City proposes, at its own expense, to extend the proposed culvert under Delmar as far south as Waterman Avenue, there joining it to the existing bridge at that place. The purpose of extending this culvert is to improve the channel by confining it within the smooth walls of the culvert, thereby reducing friction and other losses and lowering the level to which the water might rise north of Delmar.

[fol. 936] Mr. N. Johnson, a civil engineer, employed by the Wabash Railway Company, testified that the drainage area of the River Des Peres is 18.7 square miles; that the average grade is approximately six-tenths of one per cent; that during the 1915 flood eighty-

four acres of said drainage area were submerged; that if the City plan for the construction of a viaduct at Delmar were carried out, a repetition of the 1915 flood would submerge two hundred and eight acres; that the same flood conditions after the construction of said viaduct would tear the tracks to pieces and might even damage the viaduct foundations; that the flood of 1915 put the Wabash out of commission for two or three days.

Mr. C. B. Burdick, member of the firm of Alvord & Burdick, hydraulic and sanitary engineers, testified in substance that during the flood of 1915 the total flow of the River Des Peres was approximately 7,300 second feet; that of this amount about 4,300 second feet went down the river channel and the balance or 3,000 second feet went down the Wabash right of way; that if the City's complete plan of grade separation were carried out and all water excluded from the Wabash right of way, a repetition of the 1915 flood would cause the water to rise at Delmar to about elevation 86.8, or about 2.8 feet above the top of the retaining wall shown by the City plan for the protection of the Wabash tracks, provided that the proposed culvert [fol. 937] under Delmar is extended to Kingsbury bridge, but if only the upstream 500 feet is constructed, then the water would rise to elevation 90.83, or about 6.8 feet above the wall which is shown on the City plan for the protection of the Wabash tracks; that it is quite possible that greater floods than that of 1915 will occur, and that it is possible that a flood which has occurred will reoccur; that the plan proposed by the City to protect the Wabash property from flood is not reasonably adequate; that the more extensive municipal improvements are on that drainage area, the greater the floods are likely to be; that a repetition of the 1915 flood after the construction of the proposed viaduct at Delmar would be somewhat more destructive right at Delmar; and that the 42-inch sewer shown on the City plan for the drainage of the proposed depression south of Delmar is inadequate to drain the Wabash cut alone.

On cross-examination, Mr. Burdick stated that the City plan for the complete control of the River Des Peres appears to solve the question of the River Des Peres flood breaking into the proposed Wabash depression; that with the proposed River Des Peres conduit extended down to Waterman bridge, the water level about Delmar would not exceed 79.99 during a repetition of the 1915 flood; and that this elevation is approximately 4 feet lower than the proposed embankment for the protection of the Wabash tracks.

[fol. 938] Mr. Ned H. Sayford, president of the Morgan Engineering Company, hydraulic and sanitary engineers, testified, in substance, that the elevation of the wall proposed by the City for the protection of the Wabash tracks from flood would be less than half a foot higher than the City's estimate of the elevation of the entire flood which went down the river; that City's estimate of the elevation of the flood water should be increased; that with the proposed culvert extended to Kingsbury, the project would not be adequate against a repetition of the 1915 flood, certainly not against a storm greater, and in any case does not provide the same degree or factor of safety that similar works built elsewhere provide and which are accepted in gen-

eral practice; and that the provision for an area of the permanent sewer 30 per cent greater than that provided for in the culvert is indicative that someone believed the present plan not adequate.

In the event that the grade separation work south of Delmar is carried out after the River Des Peres sewer has been completed, the City plan provides for draining the depressed portion of the railroad right of way into that sewer as shown by City Exhibit No. 80.

If the grade separation work south of Delmar is carried out in advance of the construction of the River Des Peres sewer, the City plan provides for the construction of a forty-two-inch sewer across Forest [fol. 939] Park from the Wabash tracks at De Baliviere Avenue to the River Des Peres at Tamm Avenue, a distance of about 10,000 feet.

The City claims that the proposed Wabash cut between Delmar and Kings-highway would be made in an unusually firm, hard clay in which there is no reason to expect ground water to be present in any considerable amount.

To determine the amount of ground water, test pits were sunk by the City, on the Wabash right of way near Union Boulevard, near De Baliviere Avenue and about half-way between Union and De Baliviere. The test pit at Union Avenue was started on September 20, 1916. The rainfall during the seven days preceding the beginning of the excavation was 0.14 inches. This hole was completed on September 23rd, and on that date five buckets of water had seeped into the hole. This hole was dug eighteen feet deep, five feet deeper than the proposed depression of the Wabash track at that point. Between September 23, 1916, and November 16, 1916, the seepage water in the hole reached a depth of 33 inches. That means that the water reached an elevation of about 2 feet below the elevation to which — is proposed to depress the tracks.

Excavation of the pit near De Baliviere Avenue was started on September 25, 1916, and completed on September 28, 1916. This [fol. 940] hole was 23 feet deep, or 5 feet deeper than the proposed track depression at that point. Up to November 13, 1916, the water in this hole reached a depth of 79 inches, or approximately 9 inches above the proposed track depression at that point.

The pit between Union and De Baliviere was dug on September 18, 1917, to a depth of 20 feet, which is 4 feet below the elevation to which it is proposed to depress the track at that point.

The rainfall on September 27 was 1.3 inches. As this hole was located at a point so that it would drain the surrounding territory, surface water drained into the hole. There was seventeen feet of water in the hole on February 14, 1918, when it was filled up.

Wabash Exhibit No. 33 shows that the City plan provides for the depression of the tracks at Union Boulevard about 15 feet, at De Baliviere Avenue about 16 feet, at Waterman Avenue about 15 feet, and at Hamilton Avenue about 6 feet; and shows that the tracks would be depressed below the elevation of ground water from a point near Union Boulevard to a point north of De Baliviere Avenue, a distance of approximately 4,400 feet. The maximum depth of ground water above the depressed track would be about 5 feet.

Mr Cunningham, chief engineer of the Wabash Railway Company, testified:

[fol. 941] "I had had some experience with water in that vicinity. When reconstructing Grand Drive bridge and tearing down the old foundation in 1904, we encountered a tremendous amount of water, though we didn't go very far down with the foundation; it was my intention at that time to take out all the old stone in the foundation, but I found we would be running into difficulties that would be hard to encounter, so I built the new structure on parts of the old foundation without removing them. During the World's Fair, the Wabash raised its track over De Baliviere and depressed the street sufficiently to permit of pedestrians entering the grounds of the World's Fair in 1903—at that time the street car company built an undercrossing just southwardly, or easterly, whichever you call it, from De Baliviere and went with their street car tracks under the railroad. That is one of the main entrances to the World's Fair. During the time when people were using the undercrossing at De Baliviere and during the time when street cars were using that undercrossing, there was at times sufficient water, both in the street car cut and in the cut under the street, to prevent the use of them, though both of them were [fol. 942] drained; in addition to the drain under the street car passage, there were pumps and these pumps were used almost continuously. * * * At my suggestion additional pits were sunk to determine the water level, one near Union, one near De Baliviere and one or two intermittently.

"Water was then kept track of in these wells. I went down to one of these wells and found that the soil was somewhat of a porous nature and readily stuffed off. The City went a little deeper than necessary in one of these wells and punctured something that developed an artesian well, so the water came nearly to the surface. I think they said it was sixty-five feet deep. If that is a fact, how will we know where the water will be when we come to excavate through that? We excavated in four places; we might strike a place where the water might be serious. The result of ascertainment of this water resulted in a further change in the City's plan; that made it necessary to put extensive drains in the cuts and approaches, and to cap the climax, a long 42-inch sewer, 10,000 feet long, from De Baliviere clear through the park until it reached the River Des Peres on the other side of the park; in addition, they thought another change might be advisable; instead of carrying the railroad along [fol. 943] its original embankment, they thought they would change the railroad so as to cross Lindell and Union at its intersection in the park, the object being to save the cost of the bridge supposedly, but really to get enough elevation in Union Avenue to cross the bridge. I objected, not only on account of the grades, but the possibility of wetness of the soil and sub-grade and to low clearances under bridges and to many features that were advanced by other engineers."

The City introduced evidence to show that track depression did not depreciate the value of adjacent property, while the Wabash

introduced testimony to show that track depression did depreciate adjacent property.

The City engaged men specializing in each of the different classes of work involved to prepare estimates of the portions of the work in which they were expert and to present their estimates before the Commission.

The totals of these estimates were brought together in City's Exhibit No. 97. To the totals there given, it was later found and brought out in the City's testimony that to them should be added items totaling \$62,795.70.

After making this adjustment, the City's estimate, based on con-[fol. 944] struction costs of March, 1921, shows that the cost of all work shown on the City's plans for the entire project, except adjustment of industry tracks lying wholly off the railroad right of way, and work outside the city limits, would be \$2,274,977.34 if the entire project is carried out before the River Des Peres sewer is constructed, and \$1,928,395.39 if Delmar viaduct is constructed first and the balance of the work is carried out after the completion of the River Des Peres sewer. The cost of adjusting industry tracks within the city would be \$101,039.43, and out of the city would be \$99,416.90, and all other work outside of the city would be \$80,260.69.

The Wabash Railway Company submitted an estimate of the cost of the City plan within the city limits, exclusive of the Delmar viaduct, but inclusive of the industrial spurs lying off the right of way and assuming that the work would be carried out in advance of the construction of the River Des Peres sewer.

That estimate, which is Wabash Exhibit No. 49, amounts to \$3,051,090. The corresponding figure of the City's estimate amounts to \$1,810,869.78. The City contends that the Wabash estimate is excessive and should be reduced by \$989,654.30, and states that the deduction of that amount from the Wabash estimate will reduce that estimate to \$2,061,435.70, which is \$220,565.92, or 11.9 per cent in excess of the City's estimate.

[fol. 945] (5) Wabash Plan for Track Elevation.

The Wabash plan provides for track elevation beginning at the west end of the bridge over Grand Drive in Forest Park, proceeding thence on a grade of 0.44 per cent west and north to Lindell Boulevard, across Lindell and Union Boulevards on a level grade, from Union Boulevard to De Baliviere Avenue on a grade of 0.1838 per cent, from De Baliviere Avenue to Etzel Avenue in St. Louis county on a grade of 0.1418 per cent, and from Etzel Avenue to point about 500 feet south of Page Avenue on a level grade.

This plan provides for carrying all intersecting streets between Grand Drive and Page Avenue under the tracks in subways. This work is to be accomplished without disturbing the present street grades within the limits of the City of St. Louis.

The Wabash plan provides for an elevation of the tracks of about 18 feet at Union and Lindell Boulevards, about 19 feet at De Baliviere

Avenue, about 20 feet at Waterman Avenue, about 22 feet at Hamilton Avenue, about 21 feet at Delmar Boulevard, and about 20 feet at Olive Street Road. Attractive ornamental concrete structures are provided at each of these street intersections. The plan also provides for sodding slope of the embankments.

The City, residents on Lindell Boulevard and Portland Place, the City Plan Commission, the St. Louis Real Estate Exchange, the [fol. 946] West End Grade Crossing Association, several architects and a former park commissioner; all object to the Wabash plan for the following reasons:

"That it will eliminate the other grade crossings and will substitute in place of them dangerous obstructions in the streets that will not only restrict their width, but offer hazards to traffic second only to the grade crossings themselves.

"It will increase the prominence of the railroad in the park and perpetuate the barrier it now offers to park development.

"It will require fine residence streets to pass down under unsightly structures and through dark and narrow passageways.

"It will erect a great barrier between Forest Park and the property north of it.

"It will very materially increase the liability of flooding of large areas of residence property.

"It will do millions of dollars of damage to private property.

"It will give the Wabash railroad a small stretch of superfine grade wholly out of keeping with anything it now has or ever may reasonably expect to have.

"It will cost at least \$113,000 more than the City's plan."

[fol. 947] Mr. Edward B. Pryor of 5257 Lindell Boulevard, formerly one of the receivers of the Wabash Railway, testified, in substance, that in conjunction with the other receivers (Mr. Delano and Mr. Bixby) and while acting in the capacity of receiver, he had agreed to a plan of separation at Delmar substantially the same as that now proposed by the City, and agreed to pay \$120,000 towards the construction of a viaduct at Delmar; but when the ordinance was drawn up, the City injected a clause requiring the railroad to pay \$20,000 to \$25,000 for straightening the River Des Peres and for that reason the ordinance was not accepted. Mr. Pryor stated further that the depression of the tracks would add to the beauty of the park and that the track elevation would seriously damage his property.

The City contends that the railroad grades proposed in its complete plan are more favorable than present grades on this section of the Wabash Railroad. This contention is admitted by Mr. Cunningham, chief engineer of the Wabash.

The maximum rate of grade proposed by the Wabash plan is 0.44 per cent. The City claims that a grade of 0.44 per cent on this 3-mile section of track is wholly out of keeping with the track grades either east or north of this section; that the existing grades in either direction from it, but particularly the several miles of one per cent grade between said section and Ferguson, limit the size of [fol. 948] trains that can be hauled over this line.

In support of the Wabash plan, the railroads state that the first problem is to carry the railroads from one piece of high ground to another across a basin or valley and that, other things being equal, the most feasible way to do so is by an elevation plan raising the tracks above the lower ground. This would help the railroad grades and provide a comparatively easy method of grade separation by passing the intersecting streets under the elevated railroad grade.

Mr. A. M. Currier, engineer of grade separation for the New York Central Railroad, testified, in substance, that in his opinion, the elevation of the railroad is much more desirable from all standpoints, the standpoint of the municipality as well as that of the railroad; that, in general, track elevation costs less than track depression; that track depression causes many operating troubles on account of the presence of water and blocking of the railroad by snow; that track elevation causes less smoke nuisance; that streets are less disturbed during construction work when tracks are elevated; that track depression does not permit the development of the right of way to the full extent possible when tracks are elevated; and that tracks have been elevated in Chicago, South Bend, Fort Wayne, Toledo, Detroit, Fort Clinton, Valeria, Cleveland and [fol. 949] Erie.

Referring to the problem under consideration herein, Mr. Currier stated, in substance, that the elevation of the railroad is much more preferable and under the peculiar circumstances surrounding the territory is the only thing to do; that in view of these conditions it would be neither safe nor practical to attempt to depress the railroad tracks; that speaking generally, track depression is more expensive than track elevation; that in this instance the tracks could be elevated with little interruption of street traffic, but in the event of track depression, it would be very impractical and expensive to handle street traffic at all while the tracks were being depressed; that unless the tracks are depressed 25 feet or more, a hump is introduced in all of the city streets obstructing the view; that a railroad cut becomes a dumping ground for tin cans, old boilers, bedsprings, etc., and is unsightly; that bridges over railroads are made unsightly by blasts from locomotives; that in this particular case, plans provide for depressing the tracks below ground water, which is an exceedingly serious matter; that track elevation would be most favorable to all parties; that the smoke settling down in the railroad cuts would obstruct the view of signals controlling the operation of trains; that when streets have been raised by viaducts, or otherwise, consequently damages usually amount to the [fol. 950] full value of abutting property, and the usual practice is to leave the property at the old elevation, fill it up with undesirable tenants and let the property deteriorate; and that the 18-foot clearance provided by the City plan is unreasonable and impracticable.

Mr. W. S. Dawley, consulting engineer, and former chief engineer of the Chicago & Eastern Illinois Railroad Company, testified, in substance, that the most serious objection to the City plan is the proposed grade; that in his opinion no locating engineer would

ever lay a grade as suggested by the City, if it were possible to avoid it; that the Wabash plan provides for more favorable track grades and will not disturb the street grades; that the cost to depress the tracks will materially exceed the cost of elevating the tracks; that the proposed depression of the tracks below ground-water level might or might not be a serious matter, depending upon the character of the soil; that track depression would result in additional cost of maintenance and additional cost of operation; and that it would cost less to eliminate the grade crossings at Hamilton and Delmar under the Wabash plan than it would to eliminate the grade crossing at Delmar alone under the City plan.

Mr. C. W. Roehrig, consulting engineer, testified, in substance, that the proposed plan of elevating the Wabash tracks is far better [fol. 951] from every standpoint than a depressed track for the reasons that noise and smoke nuisance resulting from track depression would be greater; that track depression would require greater track grades; that track depression would offer greater opportunity for trespassing; that the depression would be unsightly; that the Wabash plan would obstruct the view less than the City plan for the reason that the Wabash plan contemplates only one fill for the entire length, while the City plan requires forty-two separate embankments on account of raising the street grades and grades of connecting streets and alleys in order to carry Delmar, De Baliviere, Union and other streets over the Wabash tracks.

Mr. Roehrig stated further that under the city plan there would constantly be a danger and menace of the Wabash being put out of business entirely by the overflow of the River Des Peres coming down and getting into the Wabash cut and filling it up with water that would take some time to get out, for the reason that the only provision for draining the water is through a 42-inch sewer about two miles long through Forest Park; that the purpose of that sewer is to take care of the surface drainage that comes down that cut and it is scarcely sufficient or not more than sufficient to take care of the ordinary heavy rains and it is not intended or expected to take care of any flood waters of the River Des Peres; that this 42-inch [fol. 952] sewer, which it is estimated will cost \$330,000 to \$335,000, would be absolutely useless and unnecessary if the River Des Peres sewer was built before the Wabash tracks were depressed; that the cost of the City plan would exceed that of the Wabash plan by 75 or 80 per cent; that the City plan has no compensating advantages which would justify this additional expenditure; that under the Wabash plan there will be no closing of streets or interruptions to street traffic while construction work is in progress, while under the City plan the streets will be closed to all traffic for a period of about two years; that under the Wabash plan there will be no changes in street grades and no consequential damages to property; that under the Wabash plan the full use of the width of the right of way permits four tracks by building retaining walls, while under the City plan there would be no room for four tracks in the proposed depression; that the vertical clearance of 18 feet provided for by the City plan is inadequate.

Mr. C. F. Loweth, chief engineer of the Chicago, Milwaukee &

St. Paul Railroad Company, and a member of the National Conference on City Planning testified, in substance, that in recent years and extending back 10 or 15 years or longer, that by far the most important and extensive grade separations have been by carrying the streets under the tracks, sometimes by a partial depression of the street and sometimes by leaving the street practically at its present [fol. 953] level, but under what may be generally termed as the track elevation plan; that where tracks were depressed there were special conditions and considerations which either induced or compelled a separation of grades by the depression method; that the advantages of track elevation over track depression, speaking generally, are a great many and they are important; that the disadvantages of track depression are very decided and are frequently such as to make operating conditions almost impracticable; that the supports and limited clearances of structures over depressed tracks are dangerous to trainmen; that the smoke settling under these structures obstructs the signals which control train movements; that depressed tracks are often difficult to drain; that the depression of tracks for grade separation costs from two to three times as much as track elevation; that the noise and smoke nuisance would be greater in the depression because the locomotive would have to be worked harder to overcome the heavier grade in the depression; that it is possible by elevation of the tracks for a railroad to develop for traffic purposes the entire width of its right of way, but with a depression of tracks it is not possible, because the sides of the depression must either be retained by slopes or by retaining walls, and those slopes or retaining walls must be upon the right of way, and to the extent that they are on the right of way that could be used for [fol. 954] railroad tracks; that under the depression scheme, three tracks is the maximum capacity of the Wabash right of way, while under the track elevation plan, the right of way would have a capacity of four tracks; that it would not be good railroading or good economics from the City or railroad standpoint to adopt a plan that will forever restrict the expansion to a three-track railroad for the reason that St. Louis is a large and rapidly growing city surrounded by a country of vast possibilities; that there is every indication of a necessity for the expansion rather than the restriction of railroad facilities; that tracks have been elevated in parks or near or adjacent to public parks in Cleveland; that the railroads of Philadelphia pass through Fairmount Park and in the proximity of other parks, and in most cases these railroads are above the general level of the park and pass over the drives in the park; that reports from Philadelphia have a great many references to the satisfactory treatment which have been given from an esthetic point of view to structures which carry streets under the railroad tracks; that plans for one of the most extensive schemes of grade separation provide for the elevation of tracks in South Philadelphia; that the City plan provides for the depression of the Wabash tracks below ground-water level for a distance of about 4,000 feet and to a maximum depth of 5 feet below ground-water level; that this condition should

[fol. 955] be avoided wherever it is possible to do it; that the City plan, providing for a long stretch of eight-tenths of one per cent grade on tracks used by heavy passenger trains and by heavy switching movements, with a passenger station at Delmar and another at De Baliviere, is bad railroad engineering; that it would require three years to complete the work provided for in the City plan; that the Wabash plan provides a very desirable grade line and would meet all reasonable requirements for future growth of traffic and would minimize all objectionable features of railroad operation in the City, especially in a park or residential district; that there is no reason why bridges for track elevation over streets cannot be made to answer all reasonable and proper requirements on the part of the municipality and the public using the streets and residents living in the vicinity of such structures; that the fact that traffic was as heavy as the evidence here indicated at Delmar would create a very strong probability of the necessity of eliminating that grade crossing; and that there are no insurmountable obstacles to be encountered in the elevation of the Wabash tracks.

Mr. G. W. Rorourke, superintendent of the Kansas City-St. Louis Division of the Rock Island, testified, in substance, that the track depression provided for in the City plan would result in wet sub-[fol. 956] grade and ballast, would increase the cost of maintenance and would interfere with the operation of the automatic block signals controlling the movement of trains; that to provide for safety of men riding on top of cars, the vertical clearance under bridges above the tracks should be 22 feet; that at the "Goose Neck" in Kansas City, where the vertical clearance above the tracks is about 18 feet, it is sometimes necessary to transfer shipments; that the adoption of the City plan would add about twenty minutes to the schedule of trains between St. Louis and Kansas City; that the track elevation plan proposed by the Wabash and Rock Island would be feasible and the thing most desirable, giving a steady grade and a better grade than the one proposed by the City.

Mr. R. H. Ford, assistant chief engineer of the Rock Island Lines, testified, in substance, that the City plan provides for railroad profiles which are far worse than at present; that the City plan provides for a ruling grade of eight-tenths of one per cent in a deep wet cut, while the Wabash plan provides for a ruling grade of less than two-tenths of one per cent elevated to the weather and consequently is much more favorable; that the cost of maintenance under the City plan would greatly exceed the cost of maintenance under the Wabash plan; that conditions in the Forest Park-Delmar territory are favorable to track elevation; that the topography of that vicinity lends [fol. 957] itself to track elevation; that, on account of the broken country in and around St. Louis, it is unthinkable that anything but track elevation would be put upon a railway spending a vast sum; that the situation is adverse to track depression; that the City plan of track depression would cost about \$4,100,000; that the Wabash plan would cost about \$2,340,000, or an excess of \$1,736,000 in favor of track elevation; that the excess cost, assuming both methods are practicable, that the City wants to have buried in this particular job in order to get its scheme of track depression, would permit the sepa-

ration of about 700 additional grade crossings in Missouri; that it would require four or five years to complete the work covered by the City plan; that track elevation presents a much simpler and more convenient problem; that it is practicable to elevate the tracks and still maintain the street and railway traffic during the construction period; that the time required to elevate the tracks would be easily about 40 per cent less than would be required to depress the tracks.

Mr. A. O. Cunningham, chief engineer of the Wabash Railway Company, testified, in substance, that some years ago Mr. Carl Gaylor, who was then City bridge engineer, looked into the situation pretty thoroughly and presented a paper on grade separation between Lindell and Delmar before the Engineers' Club of St. Louis and advocated practically the very thing the Wabash plan shows [fol. 958] today; that in 1904 a tremendous amount of water was encountered during the reconstruction of the foundations of the Grand Drive bridge in Forest Park; that during the World's Fair the Wabash raised its tracks over De Baliviere Avenue and depressed the street sufficiently to permit of pedestrians entering the World's Fair grounds; that at that time the street car company built a subway under the Wabash just east of De Baliviere; that at time water prevented the use of the subways at De Baliviere and at the street railway crossing through both of the crossings were drained, and in addition to the drains under the street railway crossing there were pumps, and these pumps were used almost continuously; that the City's first track depression plan was known as the Reber plan; that this plan was objectionable on account of excessive railroad grades and failure to provide for necessary drainage; that subsequently four test pits were sunk, one at Union, one at De Baliviere and one or two between these two streets; that the soil found in these pits were somewhat of a porous nature and readily sluiced off; that the City went a little deeper in one of these wells and punctured something that developed an artesian well; that the information derived from these test pits resulted in a further change in the City Plan and provisions were made for extensive drains in the cuts and approaches, and to cap the climax, a long 42-inch sewer, 10,000 feet [fol. 959] long, from De Baliviere clear through the park until it reached the River Des Peres on the other side of the park; that provisions were also made changing the alignment of the Wabash in Forest Park so that the railroad would cross at the intersection of Union and Lindell Boulevards; the object being to save the cost of a bridge supposedly, but really to get enough elevation in Union Avenue to cross the bridge; that he objects to the City Plan on account of the grades, the possibility of the wetness of the soil and subgrade; to low clearances under the bridges and to many features mentioned by the other engineers; that the attitude of the Wabash has been consistently in opposition to any plan for depression or grades for the railroad south of Delmar; that the Wabash railroad in Forest Park is a better one than the substitute proposed by the City; that the City Plan provides for a very long grade practically eight-tenths of one per cent from the lowest point of De Baliviere to the highest point over Page Avenue; that on all

grade separation work, the Wabash plans for track grades of four-tenths of one per cent; that the grade such as the City proposes here of eight-tenths of one per cent for the distance indicated is absurd for a new construction work; that this condition is exaggerated by the fact that a passenger depot is located at Delmar avenue on that grade and also there should and will be an interlocker at De Baliviere and the Rock Island has a passenger station at De [fol. 960] Baliviere; that the Wabash track elevation plan presents no difficulties which will prevent the construction of attractive embankments and bridges; that the Wabash Plan has the advantage over the City Plan in that it entirely obviates all consequential damages to abutting property; that the Wabash Plan will not change the grade of any City street; that it eliminates the necessity for and cost of the 42-inch sewer for drainage; that it eliminates the necessity for and the cost of tearing out present tracks of the Wabash and bridge in Forest Park, and does away with all of that extra expense which the City had to go to because they had some kind of a scheme in their head that it would be satisfactory to a few citizens in the vicinity of Union Avenue; that the only objection that can be made to the track elevation plan is from two or three residents close to Union and Lindell Avenue; that the City Plan for separation of grades at Delmar will cost approximately \$1,024,000; that the separation of grades at Delmar and Hamilton under the Wabash Plan will cost approximately \$656,460; that the separation of grades under the City Plan for the whole project will cost \$4,016,198, and will cost \$2,264,152 under the Wabash Plan; and that the only feasible plan is one which provides for track elevation.

[fol. 961] (6) Grade Separation on the Rock Island.

The Chicago, Rock Island and Pacific Railway Company has the right to operate both freight and passenger trains over the Wabash tracks from the north line of Forest Park to Eighteenth Street. Between Lindell and Union Boulevards and between Union and De Baliviere said company owns a right of way forty feet wide, extending along the north side of the Wabash right of way, and on it has a side track which is leased to the Wabash Railway Company. At a point about 500 feet west of Union the Rock Island leaves the main tracks of the Wabash and operates to De Baliviere avenue over a single track, on the south side of the Wabash right of way, which is leased from the Wabash.

A short distance west of De Baliviere, the Rock Island has a crude passenger station or stop. From De Baliviere the Rock Island continues westwardly on its own right of way which is 60 feet wide and crosses Skinker Road, which lies just inside and roughly parallel to the western city limits. West of Skinker Road, the Rock Island passes through a high class residence district. The Washington University Campus adjoins the right of way on the south for nearly a mile.

Going west from De Baliviere, the Rock Island has an ascending grade of 0.9 per cent to a summit east of Skinker; from this summit

there is a descending grade amounting to about 3 feet in 1,500 feet, [fol. 962] thence there is a variable ascending grade which reaches a maximum of 1.44 per cent to a summit which passes through a cut twenty-five feet deep.

The Rock Island traffic east of De Baliviere consists of two passenger trains daily in each direction. The additional traffic west of De Baliviere consists of a switch train about three times a week.

The City proposed to the Rock Island Company a plan for diverting its passenger trains between De Baliviere Avenue and the connection with the Terminal Belt tracks at Elmwood Park. The rerouting of the Rock Island passenger trains proposed by the City consists of continuing them over the Wabash tracks to Page Avenue, there building a connection with the Terminal Belt tracks to the west, and running the passenger trains from that point west to the main line of the Rock Island, over the same tracks that are now used by its freight trains. This new route for the Rock Island passenger trains would be 628 feet shorter than the present route and would pass the Delmar Station, where the City suggests a presentable joint station might well be built for both roads.

The City claims that this rerouting of the Rock Island passenger trains would make possible the removal of its tracks between De Baliviere Avenue and Forsythe Boulevard, thereby eliminating the grade crossings with De Baliviere Avenue and Skinker Road in St. Louis and Pennsylvania Avenue and Pratt Avenue in University City.

The City of St. Louis proposed to acquire from the Rock Island Company (and the owners of the fee in the land) the property proposed to be abandoned as right of way as far west as the city limits, and arrangements have been made for the acquisition of the property located in University City. It is proposed to widen the property and use it as a public highway as shown on City's Exhibit No. 54. This plan was approved by University City as indicated by City's Exhibit No. 78. The proposed rerouting of the Rock Island passenger trains would mean the elimination of passenger train service at Clayton. The City of St. Louis claims that this arrangement was approved by the City of Clayton, as shown by City's Exhibit No. 173.

The evidence shows that the City's plan for rerouting the passenger trains of the Rock Island Company has been the subject of conference between Mr. C. A. Morse, chief engineer of the Rock Island Company, and the engineers and officials of the City. The City states that the approval of the Rock Island officials is very definitely stated in Mr. Morse's letter of July 25, 1917 (City's Exhibit No. 55), wherein he states:

"This matter has been given consideration and it has been recommended, after a conference of the officials of the road, that if a fair [fol. 964] contract can be made with the Wabash for using their line between De Baliviere Avenue and Page Avenue; if permission can be secured from the Missouri Public Service Commission for the abandonment of our line between De Baliviere and Lackland, and if permission can be secured from the trustee of the mortgage to do

this, that the line between De Baliviere and Lackland be abandoned and use the Wabash Terminal Company's tracks between these points."

Since the above letter was written, there appears to be a change in the attitude of the Rock Island with respect to the proposed plan of the City for rerouting the Rock Island passenger trains.

Mr. R. H. Ford, assistant chief engineer of the *of the* Rock Island Company, testified in part as follows:

"* * * I am not in position to state officially at this time that our company will not abandon its tracks and come in over your suggestion. I think I could qualify that answer by saying that, while I am not prepared to officially state that, I know they won't do it; we couldn't afford to do it, to sacrifice our investment there. The City seems to have an idea that the only value we have there is a piece of land; we certainly wouldn't feel, I know, that the [fol. 965] payment of \$150,000 or \$200,000 was adequate for the right of way.

"* * * the effect of that would be merely this, that we would be disposing of our railroad from its connection with the terminal for about \$150,000 or \$200,000, and, of course, we never could do that; St. Louis is a big city, it is a growing city, it would be unthinkable that the Rock Island would sacrifice its rights and equities, even though it was inclined to, for any such sum as proposed by the City.

"* * * because this route represents the most attractive route from the west into St. Louis because of its attractive possibilities in alignment and grade for the future, not the grade for the present. Let me amplify that to clear your record. What the possibilities of these railroads in the next ten or fifteen years, the conditions we will find ourselves in, is almost impossible to say, and there never was a time in the history of railroading when it is so impossible to say as it is right now; certainly it seems incredible that a very strategic and favorable entrance such as the Wabash has and the Rock Island has, by virtue of the Wabash, they would go to work and pull up their tracks under the conditions which exist at this time."

[fol. 966] The method of grade separation adopted at Delmar Boulevard will necessarily fix the manner in which any future grade separations could be made south and west of Delmar. The City Plan for grade separation at Delmar and the subsequent track depression south of Delmar would necessitate the depression of the Rock Island tracks west of De Baliviere Avenue.

The proposed profile of the tracks for accomplishing this is shown on City's Exhibit No. 56. No estimates of cost were submitted by the City for carrying out this project. The Rock Island Company, however, submitted an estimate of the cost of carrying out that portion of the work indicated by the City's profile that would be necessary to effect the grade separation at Skinker Road and meet the depressed Wabash tracks at De Baliviere Avenue, but not the elevation of the tracks over Pennsylvania Avenue. This estimate

totaled \$1,729,356.00. The Rock Island also submitted an estimate of \$1,529,601 for elevating its tracks over Skinker Road and meeting the Wabash Plan for track elevation at De Baliviere.

The Rock Island Company contends that it could not operate efficiently or economically under any system of track depression that would forever fix upon it unreasonable grades and difficult operating and maintenance conditions; that, on the other hand, if the tracks should be elevated across the River Des Peres valley, the [fol. 967] Rock Island will have an opportunity in the future to reduce the heavy grades with which it now has to contend; and that the City's plan give no consideration to any future development or of the increasing value of a railroad entrance to a terminal of the size and importance of St. Louis.

(7) Apportionment of Cost.

On City's Exhibit No. 166 there is given a tabulation showing the approximate cost of grade separation work in eight of the largest cities in the United States, to wit, New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, St. Louis and Buffalo, and the amounts paid by the respective municipalities toward the work. The average amount paid by these cities is 17.6 per cent. This tabulation also shows the percentage of the cost paid by each of the different cities or fixed by state laws, and the average of these percentages, taking each city as a unit, is about 23.1 per cent. The City states that these figures seem to indicate that on the basis of general practice in the large cities the municipality should pay somewhere between 17.6 per cent and 23.1 per cent of the total cost, of grade separation work; and that if the separation of grades is carried out in accordance with the City's plans, 20 per cent of the total cost of all work shown on the city's plans, and included in its estimate of cost (excepting the cost of adjusting industry tracks outside the railroad right of way, which should be borne by the respective industries), should be the maximum that the City of St. Louis should be required to pay, and that the Wabash Railroad Company should be required to pay the balance of the cost, except where the Rock Island Company may be directly affected.

III. Conclusions

(1) Grade Crossing at Delmar is Unusually Unsafe and Dangerous

It is now pretty generally conceded that all grade crossings are dangerous. The grade crossing toll, as compiled from the reports of the steam railroads, shows that during the first nine months of 1922 there were 446 killed and 1,363 injured in grade crossing accidents in the state of Missouri.

Traffic counts at the Delmar Crossing during six days in October, 1920, show an average traffic consisting of more than 1,000 pedestrians, approximately 200 wagons and 1,100 street cars, daily between the hours of 7 A. M. and 11 P. M. A traffic report of the United Railways Company shows that 43,488 street cars passed over the Delmar crossing during the month of October, 1920, or an

average of 1,400 cars per day. It was estimated that these cars carried an average of 33,000 persons daily over the Delmar crossing. [fol. 969] Traffic on the Wabash consists of about fifteen passenger trains and six freight trains over the Delmar crossing daily.

The crossing is protected by gates, but the record shows that these gates have not always been lowered in advance of a train movement over the crossing. In August, 1919, a street car containing 35 or 40 passengers was struck by a Wabash train at the Delmar crossing. A number of passengers were injured. It appears that only prompt action by a police officer prevented a much more serious accident. The presence of a watchman and the proper operation of all the safety devices installed by the railroad did not prevent this accident which imperiled the lives of 35 or 40 persons.

There have been twenty-five minor accidents at Delmar crossing, within the past five years, sufficiently important to get into the police records. Fire apparatus has been seriously delayed at this crossing.

Mr. C. F. Loweth, chief engineer of the Chicago, Milwaukee and St. Paul Railway Company, and who has had wide experience in grade separation matters stated: " * * * I said the fact that traffic was as heavy as the evidence here indicated would create a strong probability of the necessity of eliminating that grade crossing."

The Wabash contends that there is no reasonable necessity for the enormous outlay of money necessary to effect the separation of [fol. 970] grades at Delmar Boulevard, and states that the experience during the past 47 years substantiates that contention.

The Supreme Court of the United States held in the case of *Eric R. R. Co. vs. Public Utility Commissioners*, 254 U. S. pages 410, 412:

"Grade crossings call for a necessary adjustment of two conflicting interests—that of the public using the streets and that of the railroads and the public using them. Generically the streets represent the more important interest of the two. There can be no doubt that they did when these railroads were laid out, or that the advent of automobiles has given them an additional claim to consideration. They always are the necessity of the whole public, which the railroads, vital as they are, hardly can be called to the same extent. Being places to which the public is invited and that it necessarily frequents, the State, in the care of which this interest is and from which, ultimately, the railroads derive their right to occupy the land, has a constitutional right to insist that they shall not be made dangerous to the public, whatever may be the cost to the parties introducing the danger. That is one of the most obvious cases of the police power, or to put the same proposition in another form, the [fol. 971] authority of the railroads to project their moving masses across thoroughfares must be taken to be subject to the implied limitation that it may be cut down whenever and so far as the safety of the public requires. * * *

"If we could see that the evidence plainly did not warrant a finding that the particular crossings were dangerous there might be room for the argument that the order was so unreasonable as to be void.

The number of accidents shown was small and if we went upon that alone we well might hesitate. But the situation is one that always is dangerous. The Board must be supposed to have known the locality and to have had an advantage similar to that of a Judge who sees and hears the witnesses. The Courts of the State have confirmed its judgment. The tribunals were not bound to await a collision that might cost the road a sum comparable to the cost of the change. If they were reasonably warranted in their conclusion their judgment must stand."

Section 10459, R. S. Mo. 1919, authorizes the Public Service Commission, where in its judgment it would be practicable, to require a separation of grades at street crossings over railroads; to prescribe [fol. 972] the terms upon which such separation shall be made and the proportions in which the expenses of such alterations shall be divided between the railroads and the municipality affected thereby.

The grant of authority as contained in the statute was construed by the Commission from the beginning as ample to empower the Commission to fix the manner in which the grades are to be separated. That view of the statute has been upheld by the bench and bar of the state. The power to require the separation of grades at street crossings carries with it authority to fix the manner in which the grades shall be separated. *State ex rel. St. Joseph Light & Power Co. vs. Public Service Commission*, 272 Mo. 1, c. 650.

After a careful review of all of the evidence relating to conditions surrounding the Delmar crossing, it is our opinion that said crossing is unusually unsafe and dangerous, and should therefore be eliminated.

(2) Method of Grade Separation.

The Wabash Plan for the elimination of the grade crossing provides for the elevation of its tracks beginning at a point just west of Grand Drive bridge in Forest Park to a point beyond the City Limits of St. Louis. The Rock Island Plan provides for an elevation of its tracks to conform with the elevation proposed by the Wabash at De Baliviere Avenue.

[fol. 973] The City Plan provides for track elevation north of Delmar Boulevard and track depression south of Delmar Boulevard to a point just west of Kingshighway in Forest Park. This plan provides for leaving the tracks undisturbed at Delmar, and the elevation of the street over and across the tracks on a viaduct with an 18 foot vertical clearance. The City plan also provides for the relocation of the Wabash tracks in Forest Park and at and near the intersection of Union and Lindell Boulevards by moving the tracks south a distance varying from 50 to 150 feet. The plan also provides that the Rock Island tracks be either depressed or abandoned.

It appears that the City bases its claim of advantages in favor of its plan for grade separation primarily upon three propositions, namely: (1) that the depression of the railroad tracks between Delmar Boulevard on the north and a point in Forest Park, near Kingshighway, on the south, will produce a less unsightly railroad structure than would be produced if the tracks were elevated over the

streets; (2) that the depression plan will cause less damage to adjacent property than would be caused by track elevation; and (3) that the cost of grade separation under the City Plan will be less than the cost under the Wabash Plan.

The City Plan provides for a viaduct at Delmar crossing with long earth approaches at each end of the viaduct. The viaduct and its [fol. 974] approaches will be about 1,500 feet long. As the maximum height of the approaches is about 22 feet, it is evident that their construction along and in Delmar Boulevard will result in heavy damage to abutting property. In addition, it is necessary to elevate all streets connecting with these approaches, and practically everywhere where changes are made in established street grades there will be consequential damages to property.

The City claims that the cost of grade separation at Delmar Boulevard under its plan would cost \$529,000 to \$538,000, in round numbers, while the Wabash claims that the cost of this work would be about \$958,020. The City objects to the inclusion of certain items in this latter estimate, among which are "Temporary Relocation of Delmar Boulevard," "Telephone Company's Expense," and "United Railways Expense." The City would exclude the first item on the ground that it is unnecessary and would exclude the second and third items on the grounds that the public utilities must adjust themselves to any grades the City may establish.

If Delmar Boulevard is closed to traffic during the construction period, it appears that there will be a considerable loss of time and money in making the necessary detour via some other route and loss of business in the district that would in all probability equal the estimated cost of the temporary relocation of the street. While [fol. 975] it is true that the public utilities must adjust themselves to any grades the City may establish, it is also true that the cost of such adjustments is borne either directly or indirectly by the patrons of these utilities, and therefore in comparing the relative costs of grade separation under the different plans, these items should be included.

If we proceed on the assumption that the City's estimate of \$538,000, is correct as far as it goes, and then add the estimated cost of these three items which the City would exclude, we have the following:

Contractor's estimate (made for City) of cost of Delmar project	\$538,146.99
Temporary relocation of Delmar Blvd.	57,300.00
Telephone Company's Expense	55,000.00
United Railways expense	31,100.00
	<hr/>
	\$681,546.99

In addition it would, no doubt, be necessary to change the location of the gas mains of the Laeude Gas Light Company, and the wires, cables and conduits of the Union Electric Company.

If it were possible to alter the viaduct plan without additional

cost to make more suitable provision for the telephone conduits, the above estimate would be reduced to about \$650,000.

[fol. 976] The Wabash estimates the cost of eliminating both the Delmar and Hamilton crossings under its plan at \$670,093. It therefore appears that under the Wabash Plan two crossings can be eliminated for the cost of eliminating one crossing under the City Plan.

The City of St. Louis having recently voted bonds for the purpose of improving the channel and controlling floods in the River Des Peres, it is unnecessary to discuss the effect of possible flood conditions.

The City Plan is strongly endorsed by the City Plan Commission, local architects, owners of property in the vicinity of the proposed grade separation and by many others.

The execution of the City Plan will leave Delmar Boulevard clear, open and unrestricted in its width or effectiveness as a great traffic highway, with easy grades, which will encourage building on the abutting property.

Owing to the location of the defendants' railroads through an important residence district of the city and through Forest Park, both the separation of the grades of the streets and the railroads in that district, and the manner of doing it are of vital interest and importance to the present and future inhabitants of the city of St. Louis.

As stated heretofore, the Commission will not at this time under- [fol. 977] take to pass upon the complete plan of the City for grade separation south of Delmar Boulevard because such plan involves matters which are outside the scope of the complaint. In the event the grades are separated at Delmar Boulevard by adopting the City's Plan for raising the street there seems to be no insurmountable obstacle to a like treatment of the other crossings south of Delmar Boulevard. The degree and manner in which the tracks there should be depressed and the streets elevated to separate the grades are not to be determined in this proceeding.

After a careful consideration of all of the evidence herein, it appears that the public welfare will be best served through an elimination of the grade crossing at Delmar Boulevard in accordance with the City Plan.

(3) Apportionment of Cost of Grade Separation.

There is no fixed or generally adopted method of apportioning the cost of grade separation between municipalities and the railroads. These apportionments vary between wide limits, and are, no doubt, controlled to some extent by the particular conditions surrounding the crossing under consideration. In view of the fact that the total cost of eliminating the Delmar crossing under the City Plan will be somewhat more expensive than the Wabash Plan, it appears that the City of St. Louis should bear 40 per cent of the cost of eliminat- [fol. 978] ing the grade crossing at Delmar Boulevard, including consequential damages to property.

It appears further that the public utilities should bear the cost of adjusting their facilities to meet the conditions created by grade separation.

An order will issue in accordance with the foregoing.

All concur except McIndoe, C., who dissents in separate opinion.

Order

This case being at issue upon complaint and answer on file, and having been duly heard and submitted by the parties, and full investigation of matters and things involved having been had, and the Commission having on the date hereof made and filed its report containing its findings of fact and conclusions thereon, which said report is made a part hereof.

Now, upon the evidence in this case, and after due deliberation, it is

Ordered: 1. That the grade crossing at Delmar Boulevard, with the tracks of the Wabash Railway Company in St. Louis, Missouri, be eliminated in accordance with the City Plan for the elimination of said crossing, with a slight alteration noted hereinafter.

[fol. 979] Ordered: 2. That the work of eliminating said crossing be executed by the City of St. Louis and shall be started not later than August 1, 1923.

Ordered: 3. That the total cost of eliminating said grade crossing (estimated at \$538,146.99 by the City), including consequential damages to property, be borne 40 per cent by the City of St. Louis, and 60 per cent of said cost be borne by the Wabash Railway Company; and that the other public utilities, defendants herein, including Rolla Wells, Receiver of the United Railways Company of St. Louis, bear the cost of adjusting their facilities to meet the conditions created by grade separation.

Ordered: 4. That the Wabash Railway Company be and is hereby required to pay to the City of St. Louis the sum of one hundred thousand dollars (\$100,000) toward the construction of said grade separation on January 1, 1924; to pay an additional sum of one hundred thousand dollars (\$100,000) towards the construction of said grade separation on June 30, 1924; and to pay the balance of that part of cost assigned to it within sixty days (60) days from date of completion of the work of grade separation.

[fol. 980] Ordered: 5. That the City keep separate and accurate account of the cost of all work involved herein, and that all such records be open and available for the inspection of the interested parties, including this Commission.

Ordered: 6. That the City of St. Louis be and it is hereby required to alter its plan to make more suitable provision for telephone conduits, to the extent that said alteration can be accomplished without material addition to the cost of the viaduct.

Ordered: 7. That the Commission fully retain jurisdiction of the parties and subject-matter of this cause for the purpose of making any supplemental order herein that it may deem just and proper.

Ordered: 8. That this order shall take effect on the first day of May, 1923; and that the Secretary of the Commission shall forthwith serve a copy of this report and order on the parties interested herein, and that said interested parties be required to notify the Commission on or before the effective date of this order in the manner required by Section 25 of the Public Service Commission Law, whether the terms of this order are accepted and will be obeyed.

[fol. 981]

DISSENTING REPORT

McINDOE, Commissioner:

I am compelled to dissent from the majority opinion herein. The majority opinion holds, in substance, that the degree and manner in which the tracks should be depressed south of Delmar Boulevard, and the streets elevated to separate grades are not to be determined in this proceeding. Yet, the order herein requiring the elimination of the grade crossing at Delmar Boulevard in accordance with the City Plan absolutely necessitates the elimination of all grade crossings between Delmar and Kingshighway in accordance with the City's Complete Plan of Grade Separation. The City and all other parties, herein, admit this fact. Consequently the Commission is in effect passing upon the complete plan of the City at this time.

Complainant's brief states,

"The scope of this hearing has been so extended, and necessarily so, that it has included a complete investigation of the available methods of grade separation for all grade crossings on the Wabash and Rock Island lines between Kingshighway and the western city limits, and evidence has been submitted with reference to the traffic at all of these crossings. Nearly two years have elapsed in presenting this testimony.

[fol. 982] "In view of these facts, it seems that a determination of the entire problem should be made at this time, when the Commission has all of the facts before it. Surely, all of the time and cost of this hearing should not have to be again expended before a settlement of this whole problem is had. * * *

Therefore any conclusion reached herein should be based on the respective merits of the complete plans, with respect to which I reach the following conclusions:

(1) Method of Grade Separation

The Wabash Plan for the elimination of the grade crossing provides for the elevation of its tracks beginning at a point just west of Grand Drive bridge in Forest Park to a point beyond the City Limits of St. Louis. The Rock Island Plan provides for an elevation of its tracks to conform with the elevation proposed by the Wabash at De Baliviere Avenue.

The City Plan provides for track elevation north of Delmar Boulevard and track depression south of Delmar Boulevard to a point just west of Kingshighway in Forest Park. This plan provides for leaving the tracks undisturbed at Delmar, and the elevation of the street over and across the tracks on a viaduct with an 18 foot vertical clearance. The City Plan also provides for the relocation of the [fol. 983] Wabash tracks in Forest Park and at and near the intersection of Union and Lindell Boulevards by moving the tracks south a distance varying from 50 to 150 feet. The plan also provides that the Rock Island tracks be either depressed or abandoned.

It appears that the City bases its claim of advantages in favor of its plan for grade separation primarily upon three propositions, namely: (1) that the depression of the railroad tracks between Delmar Boulevard on the north and a point in Forest Park, near Kingshighway, on the south, will produce a less unsightly railroad structure than would be produced if the tracks were elevated over the streets; (2) that the depression plan will cause less damage to adjacent property than would be caused by track elevation; and (3) that the cost of grade separation under the City Plan will be less than the cost under the Wabash Plan.

It must be admitted that the track depression plan proposed by the City would result in less obstruction to the view from three or four residences on Lindell just east of Union into and across a portion of Forest Park. Except for this single advantage, it appears that all other advantages are in favor of track elevation. Even this single advantage will be lost to a marked degree in the event that it were impossible to relocate the Wabash tracks by moving them south, for it would then be necessary to introduce heavy street grades on the approaches to the Union and Lindell viaducts or to disturb the [fol. 984] present street grades which would result in consequential damage to property.

West and north of Union and Lindell Boulevards the rears of all buildings on land adjoining the railroad right of way face the track. There are some large garage buildings on tops of which are signs, between the tracks and the apartment houses on the south side of Pershing Avenue between Union and Lindell Boulevards and DeBaliviere Avenue. This condition exists between DeBaliviere Avenue and Delmar Boulevard. Between DeBaliviere Avenue and Skinker Road, there are no residences facing the Rock Island tracks.

The record shows that it is not unusual to elevate tracks in or in the vicinity of parks and high-class residence districts. Tracks are elevated in Fairmount Park, Philadelphia; at the entrance to Gordon Park, Cleveland; at East Boulevard in Cedar Heights, one of the better residential districts of Cleveland; at the entrance to Edgewater Park, Cleveland; at West Boulevard, near Edgewater Park, Cleveland; at Euclid Avenue, Cleveland; near Lake View Cemetery, Cleve-

land; at Summit Avenue and adjoining avenues in the high-class residential district of Minneapolis and St. Paul; in Chicago, Evanston, Oak Park, at Grand Drive in Forest Park, St. Louis.

[fol. 985] The Grand Drive bridge and the embankment on either side certainly cannot be described as unsightly. I seriously doubt whether a track depression scheme can be made any more attractive than a track elevation scheme.

The City Plan provides for a viaduct at the Delmar crossing with long earth approaches at each end of the viaduct. The viaduct and its approaches are about 1,500 feet long. As the maximum height of these approaches is about 22 feet, it is evident that their construction along and in Delmar Boulevard will result in heavy damage to abutting property. In addition, it is necessary to elevate all streets connecting with these approaches, and practically everywhere changes are made in established street grades there will be consequential damages to property. The Wabash Plan provides for no changes in street grades in the City.

The City claims that the cost of grade separation at Delmar Boulevard under its plan would cost from \$529,000 to \$538,000, in round numbers, while the Wabash claims that the cost of this work would be about \$958,020. The City objects to the inclusion of certain items in this latter estimate, among which are "Temporary Relocation of Delmar Boulevard," "Telephone Company's Expense," and "United Railways Expense." The City would exclude the first item on the ground that it is unnecessary, and would exclude the second and third items on the ground that the public utilities must adjust themselves to any grades the City may establish.

If Delmar Boulevard is closed to traffic during the construction period, it appears that there will be a considerable loss of time and money in making the necessary detour via some other route and loss of business in the district that would in all probability equal the estimated cost of the temporary relocation of the street. While it is true that the public utilities must adjust themselves to any grades the City may establish, it is also true that the cost of such adjustments is borne either directly or indirectly by the patrons of these utilities; and therefore in comparing the relative costs of grade separation under the different plans, these items should be included.

If we proceed on the assumption that the City's estimate of \$538,000 is correct as far as it goes; and then add the estimated cost of these three items which the City would exclude, we have the following:

Contractor's estimate (made for City) of cost of Delmar project	\$538,146.99
Relocation of Delmar Blvd.	57,300.00
Telephone Company's expense	55,000.00
United Railways' expense	31,100.00
Total	\$681,546.99

[fol. 987] In addition, it would no doubt be necessary to change the location of the gas mains of the Laclede Gas Light Company, and the wires, cables and conduits of the Union Electric Company.

If it were possible to alter the viaduct plan without additional cost to make more suitable provision for the telephone conduits, the above estimate would be reduced to \$649,546.99, say \$650,000 in round numbers.

The Wabash estimates that the cost of eliminating both the Delmar and the Hamilton crossings under its plan at \$670,093.00. It therefore appears that under the Wabash Plan two crossings can be eliminated for the cost of eliminating one crossing under the City Plan. That it is desirable to eliminate the Hamilton crossing is evidenced by the testimony of Mr. C. W. Roehrig, a Wabash witness, who stated:

"The City's plan of separation of grades at Delmar Avenue takes care only of Delmar Avenue itself, and separates the grade at that point alone, while under Wabash Plan for separation of Delmar Avenue grade, on account of raising the embankments and tracks on either side of Delmar, it would permit the separation of the street grade and railroad at Hamilton Avenue at the same time as at Delmar. This is almost as important as the Delmar Avenue grade separation, on account of the Hamilton School being located at [fol. 988] Hamilton and Westminster, and there are many children that attend that school from Nina Place and all through that territory south and west of the Wabash tracks, who would have to cross the Wabash tracks at Hamilton Avenue."

Turning now to the estimates of costs to carry out the complete plans, we have the following:

The City estimates the cost of all work shown on the City's plans for the entire project, except the adjustment of industry tracks lying wholly off the railroad right of way, and work outside the City limits at \$2,274,977.34, if the entire project is carried out before the River Des Peres Sewer is constructed and \$1,928,395.39 if Delmar Viaduct is constructed first and the balance of the work is carried out after the completion of the River Des Peres Sewer. The estimated cost of adjusting industry tracks within the City is \$104,039.43 and out of the City is \$99,416.90, and all other work outside the City is estimated at \$80,260.69. It therefore appears that the total of the City's estimate is \$2,558,694.36 if the grade separation is completed in advance of the River Des Peres Sewer, and \$2,212,121.34 if said work is completed after the construction of said sewer.

[fol. 989] The revised Wabash estimates of the total cost under the City's plan for the whole project, within the City, is \$4,009,110, while its estimate of the total cost under the track elevation plan, within the City, is \$2,348,289.

The testimony of the witnesses, Currier, Loweth, Cunningham, Roehrig, Dawley and Ford, all experienced railroad engineers, is to the effect that the cost of track depression greatly exceeds the cost of track elevation.

Some of the more important items of work that would be necessary

under the City's plan and which would be eliminated under the Wabash Plan are as follows:

(1) Removal and reconstruction of the Wabash tracks from the east side of Forest Park to a point west of Union Boulevard.

(2) Wrecking of Wabash bridge over Grand Drive in Forest Park.

(3) Abandonment and reconstruction of Grand Drive in Forest Park.

(4) Construction of a new bridge to carry the relocated Grand Drive over the Wabash.

(5) Acquisition of additional right of way near the intersection of Lindell and Union Boulevards.

(6) Acquisition of additional right of way west of Union Boulevard.

[fol. 990] (7) May have to acquire right of way for the construction of tracks from Union to De Baliviere, and a large building constructed on the east side of De Baliviere and immediately north of the railroad track since this proceeding was instituted.

(8) Acquire and use a public alley from De Baliviere to Delmar, which furnished a means of ingress and egress to and from a large amount of property abutting it, or to construct an expensive retaining wall.

(9) Acquire a strip of land between the Rock Island, Wabash and United Railways rights of way immediately west of De Baliviere.

(10) The street grade at the intersection of Lindell and Union would have to be raised $7\frac{1}{2}$ feet, affecting high-class property.

(11) At Waterman Avenue, the street grade would have to be raised five feet, producing a grade of about $2\frac{1}{2}$ per cent over the railroad.

(12) At Hamilton Avenue, the street grade would have to be raised five feet, producing a grade of about $2\frac{1}{2}$ per cent over the railroad.

(13) At Olive Street Road a change in the street grade would be required.

[fol. 991] (14) It would be necessary to construct retaining walls along both sides of the railroad tracks.

(15) An extensive drainage system would have to be provided which would include the following:

The River Des Peres culvert would have to be constructed.

A large sewer 42 inches in diameter would have to be constructed from De Baliviere Avenue to the River Des Peres at Tamm Avenue, a distance of 10,800 feet.

A 15-inch cast iron sewer would have to be constructed from Kingshighway west for 1,200 feet to connect with the Blackstone sewer, which sewer would have to be lowered. Other sewers connecting with the Blackstone sewer would have to be lowered and reconstructed.

A new line of 30 to 36-inch sewer would have to be constructed from Lindell and Union to De Baliviere to connect with the Tamm Avenue sewer.

A sewer would have to be constructed under the Wabash tracks from a point about 700 feet north of Delmar to De Baliviere.

Tile would have to be laid along the side of the roadway and where retaining walls are used concrete lined ditches would have to be [fol. 992] constructed with openings at intervals to allow the water to drain into the center sewer.

(16) The relocation and reconstruction of the facilities of various public utilities would be required including street car lines, telephone lines, water mains and connections, gas mains and connections, electric light and power lines, and signal lines.

(17) Raising the following streets: Hodiamont Avenue, Enright Avenue, Alley City Block No. 4542, De Giverville Avenue, Alley City Block No. 5512, Alley City Block No. 5514, Rosedale Avenue.

The cost of some of these items which are required by the City Plan but which are not required by the Wabash Plan are as follows:

Cost of changing city water mains.....	\$43,192
Relocating interlocking plant.....	25,900
United Railways expense.....	31,100
Cost of changing telephone conduits and cables.....	55,000
Lowering Blackstone sewer.....	41,000
[fol. 993] 42" brick sewer through Forest Park.....	317,061
Drainage lines in cut.....	59,248
Miscellaneous sewers.....	15,304
Raising Hodiamont Avenue.....	43,932
Raising Enright Avenue.....	3,974
Raising Alley City Block No. 4542.....	1,856
Raising De Giverville Avenue.....	7,203
Raising Alley City Block No. 5512.....	333
Raising Alley City Block No. 5514.....	323
Raising Rosedale Avenue.....	7,230
River Des Peres temporary culvert.....	380,000
Removal and reconstruction of tracks in Forest Park..	*300,000
Abandonment and reconstruction of Grand Drive....	
Wrecking Wabash bridge over Grand Drive.....	
New bridge to carry relocated Grand Drive over tracks..	
Additional right of way.....	
Cost of changing gas mains.....
Cost of changing electric wires and conduits.....

Approximate total \$1,331,756

*Approximate.

[fol. 994] In the event that the River Des Peres sewer was constructed in advance of track depression, the above total would be reduced to \$635,000, in round numbers.

It therefore appears that the cost of eliminating the grade crossings under the City Plan would be considerably in excess of the cost of such work under the Wabash Plan.

The costs discussed thus far are construction costs. The evidence shows conclusively that track depression would materially increase the cost of operating trains and maintaining the roadway and structures, principally on account of the heavier grades and drainage conditions. The City Plan provides for a ruling grade of about eight-tenths of one per cent while the Wabash Plan provides for a ruling grade of about two-tenths of one per cent. The fact that the Wabash has grades in excess of eight-tenths of one per cent on both sides of the district through which it is proposed to eliminate the grade crossings is not a sound reason for adopting a maximum grade of eight-tenths of one per cent. These heavy grades can, and no doubt will, be reduced when traffic is heavy enough to justify the cost of such grade reduction.

The City Plan provides for a vertical clearance of highway bridges above the rail of only 18 feet, which is not adequate to clear a trainman standing on a box car.

[fol. 995] The City Bridge Engineer stated:

"We know it is unsafe for a man to ride on top of a freight train with any clearance less than 22 feet and we have been aiming and the City of St. Louis has spent a good deal of its own money to give 22-foot clearances under the bridges over the tracks in the Mill Creek Valley; in the Mill Creek Valley there are a great number of railroad tracks located close together; I know that at Twelfth Street there are more than forty tracks from north to south and it is unsafe for a man to signal in switching in that district from the ground, much more unsafe than it is for a man to signal from the top of the cars; in that district there should be a 22-foot clearance."

He also stated that if the Commission required a 22-foot clearance, "It would not only throw our estimates of cost out of line, it would lose to the City's plan practically all of the advantages that are claimed for it."

Although Section 1047 of the Revised Code of the City of St. Louis makes it unlawful for a railroad company to operate trains within the City without having a man on top of the cars, and the City admits that a clearance of less than 22 feet is unsafe for a man on top of a box car, yet its plan only provides for a clearance of 18 feet.

[fol. 996] The fact that the clearances at Kingshighway and the St. Charles Rock Road are approximately 18 feet is not sufficient reason for reproducing these conditions elsewhere. Twenty-two feet is now pretty generally recognized as the proper vertical clearance.

The City Plan provides for putting the Wabash tracks down into a sump below ground water level. The tracks would be below

ground water level for a distance of about 4,400 feet. The maximum depth below ground water level would be about 5 feet. This is a condition which should be created only in case of absolute necessity.

It would be a serious mistake to order track depression in advance of the construction of the River Des Peres sewer. The City's plan for the temporary improvement of the River Des Peres does not provide a sufficient factor of safety against floods. While a witness for the City predicts that a storm like that which caused the flood of August, 1915, will not occur again in 1,200 years, attorneys for the Wabash, in their brief, state that the records of the United States Weather Bureau, covering Missouri, Iowa and Illinois, show 89 storms from 1898 to 1922, of about the same or greater intensity than that which caused the flood of August, 1915.

The City Plan provides for the relocation of the Wabash right of way and tracks through Forest Park. The present right of way through Forest Park was acquired under a contract between the [fol. 997] Park Commissioners and the predecessors of the Wabash Company, dated August 11, 1875, whereby the Wabash predecessor companies conveyed to the City a right of way previously acquired across a portion of land that now constitutes the northeasterly corner of Forest Park and located some distance northeast of the present right of way. The Act of the Missouri Legislature, approved March 25, 1874, and known as "The Forest Park Act" (Laws Mo. 1874, p. 371) expressly authorized said Park Commissioners to enter into the contract above referred to, and this contract has been decreed to be a valid and binding obligation of all parties thereto. (*Jay v. St. Louis*, 138 U. S. 1.) The Wabash predecessor companies constructed their railroad upon the right of way granted and located by said contract, and the City concedes that it was constructed in accordance with the terms of said contract.

In view of the fact that it is feasible and practicable to eliminate the grade crossings under consideration without relocating the right of way and tracks of the Wabash through Forest Park, we know of no means whereby the Wabash could be forced to relocate its right of way and tracks merely for the purpose of complying with the provisions of a particular plan of grade separation.

Track elevation can be accomplished without relocating the right of way, without changing the established grade of a single city street, [fol. 998] without interruption of street traffic and without inconvenience or loss to owners of adjacent property, without disturbing water or gas main, telephone cables and conduits, electric wires, or sewers, and without preventing customers from reaching places where they trade.

Topographical conditions, drainage conditions, track gradients, cost of the work, cost of operation and maintenance, and ability to use the right of way for future railroad expansion are all favorable to track elevation.

Attorneys for the Wabash state, in their brief, that this Commission is without power to require the separation of grade crossings by a particular method; that the scope of authority conferred by Section 50 of the Public Service Commission Act upon the Commis-

sion with respect to "the installation, operation, maintenance, use and protection" of a crossing is quite different from the scope of the Commission's authority with respect to "the separation of grades" at any such crossing; that with respect to the former, the act confers upon the Commission the exclusive power to determine and prescribe "the manner" * * * "and the terms of installation, etc., whereas, with respect to the latter the Commission's authority is limited, when in its judgment a separation of grades should be required, "to prescribe the terms upon which such separation shall be [fol. 999] made;" and that it is at once apparent, therefore, that the act does not in terms confer upon the Commission the power or authority to prescribe the manner in which a separation of grades shall be effected, nor may it be said that the expression "term" upon which such separation shall be made "is sufficiently broad to include also the manner in which the result shall be accomplished."

If the above contention were true, it would be wholly impracticable to bring about any separation of grades. The Legislature had no intention of creating such a condition which is antagonistic to public welfare. Section 50 of the Public Service Commission Act (Sec. 10459, R. S. Mo. 1919) delegates to this Commission exclusive power over crossings of all kinds (except private crossings) 271 Mo. 274.

Paragraph 2 of said Section 50 provides that:

"The Commission shall have the exclusive power to determine and prescribe the manner including the particular point of crossing, and the terms of installation, operation, maintenance, apportionment of expenses, use and protection of each crossing of one railroad by another railroad or street railroad, and of a street railroad by a railroad, and of each crossing of a public road or highway by a railroad or street railroad and of a street by a railroad or vice versa, so far as applicable, and to alter or abolish any such crossing, and to re-[fol. 1000] quire, where, in its judgment, it would be practicable, a separation of grades at any such crossing heretofore or hereafter established, and to prescribe the terms upon which such separation shall be made and the proportions in which the expense of the alteration or abolition of such crossings or the separation of such grades shall be divided between the railroad or street railroad corporations affected or between such corporations and the state, county, municipality or other public authority in interest. (Laws 1913, p. 589.)"

Webster's New International Dictionary shows that the words, manner and terms both relate to conditions. Condition is defined as a stipulation or provision, or something established or agreed upon as a requisite to the doing or taking effect of some thing else. Consequently the word terms as used in said Section 50 is not limited to financial considerations alone, but is broad enough to cover the manner and methods of grade separation. The very language of the Act itself directs that "The provisions of this act shall be liberally construed with a view to the public welfare, efficient facilities and substantial justice between patrons and public utilities." (Sec. 127, Public Service Commission Act Laws 1913, p. 648, Sec. 10538, R. S. Mo. 1919.)

[fol. 1001] After a careful consideration of all of the evidence herein, it appears that the public welfare will be best served through an elimination of the grade crossings with the Wabash by track elevation. The adoption of this method of grade separation with respect to the Wabash necessitates the adoption of the same method with respect to the Rock Island.

(2) Apportionment of Cost of Grade Separation

There is no fixed or generally adopted method of apportioning the cost of grade separation between municipalities and the railroads. These apportionments vary between wide limits, and are no doubt controlled to some extent by the particular conditions surrounding the crossings under consideration. It appears that in this particular instance that the City of St. Louis should bear 20 per cent of the total cost of grade separation; exclusive of the cost of adjusting public utility facilities to the changed conditions, including 5 per cent of the cost of the subways at Delmar Boulevard which will be apportioned to the Receiver of the United Railways Company of St. Louis and said Company; and exclusive of the cost of changing industrial tracks lying outside of the railroad right of way.

It appears further, that the public utilities (other than the United Railways Company of St. Louis) should bear the cost of adjusting their facilities to meet the conditions created by grade separation; [fols. 1002-1014] that the apportionment of 5 per cent of the cost of the subway at Delmar Boulevard, to the Receiver of the United Railways Company of St. Louis and said Company, is just and reasonable, in view of the fact that the construction of said subway will eliminate the necessity for and the expense of stopping and flagging street cars across the Wabash tracks and will eliminate the first cost and cost of maintenance of one-half of the crossing frogs and the first cost and cost of maintenance of trolley guards at the Delmar crossing; that the industries should bear the expense of adjusting tracks lying outside of the railroad right of way to conform with the changes created by grade separation; and that the Wabash railroad should bear the balance of the expense involved in grade separation.

Petition for rehearing, covering 13 pages, filed April 30, 1923; omitted from this print.

[fol. 1015] MINUTE ENTRY OF ORDER OVERRULING PETITION FOR REHEARING

On the 4th day of May, 1923, by order duly entered of record by the Commission, said motion for rehearing was overruled.

JUDGMENT—Sept. 1, 1923

On the 1st day of September, 1923, at the June, 1923, adjourned term of said Circuit Court, the Court rendered and entered of record its judgment, order and decree, setting aside and reversing the order [fol. 1016] and findings of appellant, Public Service Commission, and remanded said cause for further proceedings to be had in conformity with the opinion of the Court, which said order and judgment and opinion are, in words and figures, as follows:

Judgment omitted: printed side page 25 ante.

[fols. 1017-1019] Opinion omitted: printed side page 26 ante.

[fol. 1020] To which action of the Court the respondents then and there duly excepted and saved their exceptions.

Thereafter, on said 1st day of September, 1923, and during said June, 1923, adjourned term of said Court, and within four days after the rendition of judgment and within the time required by law, respondent, Public Service Commission of Missouri, Henry W. Kiel, Mayor of the City of St. Louis, and the City of St. Louis, as intervening respondents, filed in said cause their motion for a new trial, which is (caption and signatures omitted) in words and figures as follows:

[fol. 1021] MOTION FOR A NEW TRIAL

"Comes now the Public Service Commission of the State of Missouri, Respondent, Henry W. Kiel, Mayor of the City of St. Louis, and the City of St. Louis, Interveners, and move the Court to set aside its finding, order and judgment made and entered in the above entitled cause, and to grant a new trial of said cause for the following reasons:

1. The finding, order and judgment of the Court is against the evidence and the weight of the evidence.

2. The finding, order and judgment of the Court is against the law.

3. The finding, order and judgment of the Court is against the law and the evidence.

4. The Court exceeded its authority by, was without jurisdiction to and erred in making and entering of record its order to reverse and remand this cause to the Public Service Commission, with instructions to proceed, as speedily as possible, to eliminate the grade crossing in question, in conformity with the views expressed in the dissenting opinion written by Commissioner McIndoe and in finding that this cause is well covered by the dissenting opinion.

[fol. 1022] 5. The Court erred in finding as a fact and in holding as a matter of law that the clearance of the viaduct provided for

in the order of the Public Service Commission is insufficient and dangerous, and in finding that said viaduct in eliminating one danger would create another.

6. The Court exceeded its authority by, was without jurisdiction to and erred in finding that the objection to the elevation plan, that said plan provided for supports or piers in the streets to support the bridges, can be overcome by the Public Service Commission ordering the bridges built without supports or piers in the streets; in that no evidence was submitted either as to the cost of bridges without supports or piers in the streets or as to how such bridges would affect the grade of the railroad or the grade of intersecting streets; and in that the estimate of costs of the Wabash or elevated plan which was presented to and heard and considered by the Public Service Commission, as the basis upon which its order was made, provided for the bridges to which said objections were made.

7. The Court exceeded its authority by, was without jurisdiction to and erred in finding that the grades provided by the Wabash plan were an argument in its favor.

8. The Court exceeded its authority by, was without jurisdiction to and erred in finding that if two crossings can be eliminated in this [fol. 1023] proceeding it should be done, even though the cost would be somewhat in excess of eliminating the Delmar crossing alone.

9. The Court exceeded its authority, was without jurisdiction to and erred in finding as a fact and holding as a matter of law, that the Wabash Railroad is not under obligations to eliminate the sump at Hamilton Avenue and that said sump should be taken care of in some other way.

10. The Court exceeded its authority by, was without jurisdiction to and erred in finding that the only material objection to the Wabash or elevated plan is that it would obstruct the view and mar the beauty of Forest Park.

11. The Court erred in finding that the advantages under the Wabash or elevated plan far exceeded those of the City plan, as now shown by the record in this case.

12. Because the Court failed upon a hearing "To enter judgment either affirming or setting aside the order of the Commission," as required by law, but in effect reversed and remanded the cause, with directions to the Commission to enter an order adopting a different, and what the Court believed to be, a better plan, which judgment and direction of the Court is without authority under the law.

13. Because the Court fails to find as a matter of law or fact that the Commission's order is unreasonable and unlawful, but substitutes its judgment for that of the Commission by adopting a different plan, which it directs the Commission to follow in separating the grades.

14. Because the finding, order and judgment is in favor of the wrong party."

Thereafter, on the said 1st day of September, 1923, and during said June, 1923, adjourned term of said Court, by its order duly entered of record, overruled said motion for a new trial, to which action of the Court in overruling said motion, respondents at the time duly excepted and saved their exceptions. Said order overruling said motion for a new trial (caption and signatures omitted) is as follows:

ORDER OVERRULING MOTION FOR NEW TRIAL

"Now, at this day, comes the Respondents, by their Attorneys, and present to the Court their motion for a new trial herein, which said motion is by the Court ordered filed, which is accordingly done, and now said motion is by the Court taken up and all and singularly the matters and things in said motion being seen and heard and by the Court fully understood, it is ordered that said motion be and it is hereby overruled, to which action of the Court in overruling said motion for a new trial, respondents duly excepted and saved their exceptions."

Thereafter, on said 1st day of September, 1923, and during the [fol. 1025] June, 1923, adjourned term of said Court and within the time required by law, the respondent, Public Service Commission of Missouri, and Henry W. Kiel, Mayor of the City of St. Louis, and the City of St. Louis, as intervening respondents, filed their motion in arrest of judgment, which (caption and signatures omitted) is in words and figures as follows:

MOTION IN ARREST OF JUDGMENT

"Comes again the Respondent, Public Service Commission of the State of Missouri, and Henry W. Kiel, Mayor, and the City of St. Louis, Interveners, and moves the Court to arrest the judgment herein rendered, for the reasons:

1. The Court erred in overruling Defendants' and Interveners' motion for a new trial.
2. Upon the whole record herein the judgment should have been for the Respondent, the Public Service Commission, fully sustaining its report and order, and the Interveners herein, and against the Petitioners, the Wabash Railway Company and the Chicago, Rock Island and Pacific Railroad Company."

Thereafter, on the 1st day of September, 1923, and during the June, 1923, adjourned term, the Court by its order duly entered of [fol. 1026] record, overruled said motion in arrest of judgment, to which action of the Court in overruling said motion, respondent then and there duly excepted and saved their exceptions.

Said order overruling said motion in arrest of judgment is (caption and signatures omitted) in words and figures as follows:

ORDER OVERRULING MOTION IN ARREST OF JUDGMENT

"Now at this day comes the Respondents, by their Attorneys, and present to the Court their motion in arrest of judgment herein, which said motion is by the Court ordered filed, which is accordingly done, and now said motion is by the Court taken up and all and singularly the matters and things in said motions being seen and heard and by the Court fully understood, it is ordered that said motion be and it is hereby overruled, to which action of the Court in overruling said motion in arrest of judgment, respondents duly excepted and save their exceptions."

Thereafter, on the 1st day of September, 1923, and during the June, 1923, adjourned term of said Court and within four days after the rendition of judgment and orders of the Court, overruling appellants' motion for a new trial and in arrest of judgment, and within the time required by law, appellants, the Public Service Commission of Missouri, Henry W. Kiel, Mayor of the City of St. Louis, and the City of St. Louis, filed their applications and affidavits for an appeal to the Supreme Court of Missouri and by order of the Court duly entered of record, an appeal was allowed said appellants to the Supreme Court of Missouri and appellants were granted time to file their bill of exceptions within the time required by law.

Said affidavits for an appeal are, in words and figures, as follows:

"IN THE CIRCUIT COURT OF COLE COUNTY, MISSOURI, JUNE TERM,
1923

[Title omitted]

[fol. 1028]

AFFIDAVIT FOR APPEAL

Come now the interveners, Henry W. Kiel, Mayor of the City of St. Louis, and the City of St. Louis, by Oliver Senti, their Agent and Attorney, and makes this application for an appeal from the judgment and decision of the Court in the above entitled cause, to the Supreme Court of Missouri, and said Oliver Senti, being duly sworn, upon his oath says that he is the duly appointed, legally qualified and acting First Associate City Counselor of the City of St. Louis, and is the Attorney and Agent of the City of St. Louis and Henry W. Kiel, its Mayor; that this appeal is not made for vexation or delay but because this affiant believes that the appellants are aggrieved by the judgment of the Court.

Oliver Senti.

Subscribed and sworn to before me this first day of September, 1923. Richard R. Nacy, Clerk of the Circuit Court."

[fol. 1029] "IN THE CIRCUIT COURT OF COLE COUNTY, MISSOURI,
JUNE TERM, 1923

[Title omitted]

AFFIDAVIT FOR APPEAL

Comes now the Respondent, The Public Service Commission of Missouri, by Louis H. Breuer, its General Counsel, and makes this its application for an appeal from the judgment and decision of the Court in the above entitled cause to the Supreme Court of Missouri, and said Louis H. Breuer, being duly sworn, on his oath says that he is the duly appointed, legally qualified and acting General Counsel to said Public Service Commission; that such appeal is not made for [fol. 1030] vexation or delay but because the affiant believes that the appellants are aggrieved by the judgment of the Court.

Louis H. Breuer.

Subscribed and sworn to before me this first day of September, 1923. Richard R. Nacy, Clerk of the Circuit Court."

Said order granting appellants an appeal to the Supreme Court and allowing time to file bill of exceptions is, in words and figures, as follows:

ORDER GRANTING APPEAL

"Now at this day, comes the respondents, by their Attorney, and presents to the Court their application and affidavit for an appeal, which said application and affidavit are, by the Court, ordered filed which is accordingly done, and now said application and affidavit for an appeal are by the Court taken up, examined and found sufficient.

It is, therefore, ordered that the appeal herein be and the same is hereby granted said respondents to the Supreme Court of the State of Missouri.

It is further ordered that Bill of Exceptions shall be filed within the time required by law.

Adjourned June Term, 1923, Saturday, September 1, 1923, Seventeenth Day."

[fol. 1031] IN CIRCUIT COURT OF COLE COUNTY

ORDER SETTLING BILL OF EXCEPTIONS

Thereafter, on the 9th day of September, 1923, during the June, 1923, adjourned term of said Court and within the time allowed by law, appellants, Henry W. Kiel, Mayor of the City of St. Louis, and the City of St. Louis, filed their cost bond in the penal sum of Five Hundred (\$500.00) Dollars, which said bond was duly approved by the Court.

And now that the above matters, things, rulings and exceptions may be made a part of the record, appellants, Public Service Commission of Missouri, Henry W. Kiel, Mayor of the City of St. Louis, and the City of St. Louis, present to the Court this their joint bill of exceptions herein and pray the Court that the same may be allowed, signed, sealed, filed, and made a part of the record in this case, which is accordingly done this 25th day of September, 1923, and during the June, 1923, adjourned term of said Circuit Court and within the time heretofore allowed by the Court, to which said Bill of Exceptions should be filed.

Henry J. Westhues, Judge of the Circuit Court of Cole County,
Missouri. Richard R. Nacy, Clerk of the Circuit Court.

IN CIRCUIT COURT OF COLE COUNTY

STATEMENT RE EXHIBITS

The exhibits introduced in said hearing and included in this bill of exceptions and as a part of this Abstract of the Record, it [fol. 1032] is agreed by stipulation, cannot be here printed or set out, and that the originals thereof now on file with this Court may be used and considered as a part of said bill and abstract, together with oral testimony hereinbefore set forth, including all the evidence introduced in said Commission Case No. 2732 before the Public Service Commission.

And appellants perfected their appeal herein by filing with the Clerk of the Supreme Court of Missouri a certified transcript of the proceedings had in said Circuit Court with the transcript of proceedings had before the Public Service Commission in said cause, and submits the same by this Abstract.

L. H. Breur, General Counsel; Frank E. Atwood, Asst. Counsel, For Appellant Public Service Commission.
George F. Haid, City Counselor; Oliver Senti, 1st Asso. City Counselor, for Appellants Henry W. Kiel, Mayor, and The City of St. Louis.

[fol. 1033] IN SUPREME COURT OF MISSOURI, APRIL TERM 1924

No. 25086

STATE OF MISSOURI at the Relation to and Use of the WABASH RAILWAY Company and Chicago, Rock Island and Pacific Railroad Company, Respondents,

vs.

PUBLIC SERVICE COMMISSION OF MISSOURI and JOHN A. KURTZ, E. J. Bean, Noah W. Simpson, and A. J. O'Reilly, Members of said Public Service Commission of Missouri; Henry W. Kiel, Mayor, and The City of St. Louis, Appellants.

[fols. 1034-1044] STIPULATION RE EXHIBITS

It is stipulated and agreed by and between the parties to this proceeding, through their Attorneys, that the exhibits in this case cannot properly be set out and printed in this record and that such original exhibits introduced at the hearing in this cause are included in the Bill of Exceptions and may be taken and considered as a part of the printed record herein and in connection therewith.

L. H. Breuer, Frank E. Atwood, Geo. F. Haid, Oliver Senti, Attorneys for Appellants, Public Service Commission and Henry W. Kiel, Mayor, and The City of St. Louis. N. S. Brown, Homer Hall, Attorneys for Respondents.

[fol. 1045] IN SUPREME COURT OF MISSOURI, DIVISION NO. 1

No. 25086

STATE OF MISSOURI ex Rel. WABASH RAILWAY COMPANY et al., Respondents,

vs.

PUBLIC SERVICE COMMISSION OF MISSOURI et al., Appellants

No. 25087

STATE OF MISSOURI ex Rel. WABASH RAILWAY COMPANY et al., Respondents,

vs.

C. H. RODEHAVER et al., Appellants

No. 25088

STATE OF MISSOURI ex Rel. WABASH RAILWAY COMPANY et al., Respondents,

vs.

F. H. GERHART, Appellant

SUBMISSION OF CAUSES—Apr. 21, 1924

Come now the said parties, by their respective attorneys, and, after argument herein, submit these causes together to the Court,

with leave of fifteen days to the said appellants to file reply brief herein.

[fol. 1046] IN SUPREME COURT OF MISSOURI, DIVISION No. 1,
OCTOBER TERM, 1924

25086

STATE OF MISSOURI at the Relation to and Use of the WABASH Railway Company and Chicago, Rock Island and Pacific Railroad Company, Respondents,

vs.

PUBLIC SERVICE COMMISSION OF MISSOURI and JOHN A. KURTZ, E. J. Bean, Noah W. Simpson, and A. J. O'Reilly, Members of said Public Service Commission, and Henry W. Kiel, Mayor, City of St. Louis, Missouri, Appellants

Appeal from the Circuit Court of Cole County

No. 25087

STATE OF MISSOURI at the Relation to and Use of the WABASH Railway Company and Chicago, Rock Island and Pacific Railroad Company, Respondents,

vs.

C. H. RODEHAVER, SAMUEL J. KIEFFER and WEST END GRADE CROSSING ASSOCIATION, Appellants

Appeal from the Circuit Court of Cole County

25088

STATE OF MISSOURI at the Relation to and Use of the WABASH Railway Company and Chicago, Rock Island and Pacific Railroad Company, Respondents,

vs.

F. H. GERHART

Appeal from the Circuit Court of Cole County

JUDGMENT—Nov. 25, 1924

Now, at this day, come again the parties aforesaid, by their respective attorneys, and the Court here being now sufficiently advised of and concerning the premises, doth consider and adjudge that the judgment aforesaid, in form aforesaid, by the said Circuit Court of Cole County rendered, be reversed, annulled and for naught held and esteemed, and that the said appellants be restored to all things which they have lost by reason of the said judgment. It is further

considered and adjudged by the Court that the said cause be remanded to the said Circuit Court of Cole County for further proceedings to be had therein, in conformity with the opinion of this Court herein delivered; and that the said appellants recover against the said respondents their costs and charges herein expended and have execution therefor. (Opinion filed.)

Which said opinion is in the words and figures following, to-wit:

[fol. 1047] IN SUPREME COURT OF MISSOURI, DIVISION NUMBER ONE

No. 25086

[Title omitted]

OPINION

I

This is an appeal by Henry W. Kiel, Mayor of the City of St. Louis, and by said City and certain intervening property owners, from a judgment of the Circuit Court of Cole County, setting aside an order of the Public Service Commission, abolishing the grade crossing of the Wabash Railroad over Delmar Boulevard, in said City.

The order set aside was made by a majority of the Commission and required a viaduct, according to the City Plan, to be constructed in Delmar Boulevard, carrying said Boulevard over the tracks of the Railroad at said crossing. There was a dissenting opinion by Commissioner McIndoe, holding that the "Wabash Plan" of elevating the tracks of the Railroad over the street at this crossing, should be adopted. The majority opinion and order required the City of St. Louis to pay 40 per cent, and the Wabash Railroad Company, 60 per cent of the cost of constructing said viaduct, and the street railway and other public utilities using said crossing to pay the expense of adjusting their facilities to the changed conditions. The order suggested by the dissenting Commissioner and adopted by the circuit court was, that the City should pay 20 per cent of cost of separating the grades according to the Wabash plan, and the street [fol. 1048] railway to pay five per cent of the cost of the subway at Delmar Boulevard—all other public utilities and industries affected, to pay the cost of adjusting their facilities to the new conditions and the Wabash Railroad Company to pay the balance of the expense.

The Wabash Railroad enters the City of St. Louis from the north and crosses the westerly line of the city limits at Maple Avenue. It then runs south and southeasterly in a somewhat irregular course to Kingshighway, a distance along the railroad of about three miles. Kingshighway runs north and south along the eastern line of Forest Park. In its course from Maple Avenue, an east and west street, which it crosses on grade, to Kingshighway, the railroad crosses suc-

cessively, on grade, Olive Street Road, Delmar Boulevard, Hamilton Avenue, Waterman Avenue, then De Baliviere Boulevard, where it crosses the tracks of the Rock Island Railway Company, which comes into St. Louis from the west. From De Baliviere Boulevard both roads adjoining each other run east approximately one-half mile, where they cross Belt Avenue (or what was formerly Belt Avenue) and then continuing southeasterly nearly a quarter of a mile they cross Union Avenue near its junction with Lindell Boulevard, crossing Lindell Boulevard about 50 or 100 feet southeast of Union Avenue. Lindell Boulevard runs east and west along the north boundary of Forest Park. All the other streets crossed run practically east and west at their intersection with the railroad tracks. Up to this point all said crossings are grade crossings. Leaving Lindell and proceeding southeasterly, the Rock Island uses the Wabash tracks through Forest Park into St. Louis Union Station. The Wabash tracks enter Forest Park where they cross Lindell Boulevard and run on an embankment and pass over Grand Drive in the Park on a bridge, about 20 feet above the roadway. They then run in a southeasterly direction through the Park, crossing a way for pedestrians on grade, to the last line of Forest Park, where they strike Kingshighway, which they pass under through a tunnel, having a clearance for trains of 17 feet 3 inches. The distance along the railroad through the Park is about three-quarters of a mile, and the [fol. 1049] bridge over the Grand Drive is about midway between Lindell Boulevard and Kingshighway. The Park itself is one of the principal—the largest—and perhaps the most highly improved Park in the City. The whole district between Lindell and Delmar Boulevards through which the railroad runs—a distance of nearly a mile and a half—is a highly improved and beautiful residential district containing many very costly homes. North of Delmar Boulevard for perhaps two blocks on the east side of the tracks is also an attractive residence district, but north of these two blocks and on the west side of the tracks the railroad runs through an industrial district to the City limits. The entire section north of Forest Park to Delmar Boulevard, extending several miles east and west into University City, is thickly populated and is a most attractive residential part of the City.

The complainant alleged that on account of the heavy travel on Delmar Boulevard, which is one of the main thoroughfares running through the center of the City of St. Louis from east to west, and the number of trains operated over said crossing by the Wabash Railway Company, said grade crossing had become exceedingly dangerous for all travelers on the street, and praying that the grades should be separated by the construction of a substantial viaduct in said Boulevard over said tracks, the expense to be borne by all parties affected thereby, in such proportion as the Commission should prescribe.

The answer of the Wabash denied that public travel was such as to require any separation of grades at said crossing, averred that the construction of a viaduct in said Avenue as requested by this proceeding was but a part of the "complete plan" of the City of St. Louis, already prepared, and would require numerous other grade

crossings south of Delmar Boulevard to be abolished by requiring the railroads to depress their tracks under the streets, which would be wholly unreasonable and impracticable, and prevent the abolishing of such grade crossings in the future by an elevation of the tracks over the streets. That requiring the railroads to so depress [fol. 1050] their tracks as contemplated by the "complete plan" of the City, would violate the contract entered into between the Forest Park Commissioners and the Wabash Railroad's predecessor in title, by which, under authority of an Act of the Legislature of Missouri, approved March 25, 1874, said railroad right of way was located and the grade thereof established through Forest Park in said City as it now exists; that said contract provided it should not be changed without the consent of all parties interested and that to do so would take and damage the railroad's property, without compensation and without due process of law and violate the obligation of contracts contrary to the provisions of the State and Federal Constitutions, and also abrogate the Wabash contract with the Rock Island for the use of its tracks through Forest Park from which the Wabash receives a rental of \$2,500 per month.

The answer of the Rock Island substantially agreed with that of the Wabash, setting up that the larger, or "complete plan" of the City, of which the present proceeding for a viaduct on Delmar Boulevard over the Wabash tracks was but a part, would necessitate the lowering of the Rock Island tracks from its connection with the Wabash tracks at Lindell Boulevard, and for some distance west thereof beyond De Baliviere Boulevard, and would be wholly unreasonable and impracticable.

The answer of the City of St. Louis admitted the allegations of the complaint and joined in the prayer thereof.

Certain property owners also intervened and supported the City in its contentions.

At the hearing, the Wabash Company presented a plan for raising the grade of its tracks at Delmar Boulevard and proposed that any separation of grades at grade crossings throughout the entire district should be by raising the railroad embankments and crossing over the streets, leaving the streets as they are, instead of as proposed by the plans of the City—that of depressing the tracks under the streets and constructing viaducts in the streets over the tracks. The Rock Island Railroad will not be directly affected by the present proceeding [fol. 1051] ing, which involves only the crossing at Delmar Boulevard. But it is indirectly affected in that the topography is such that if a viaduct is now constructed over the Wabash tracks in Delmar Boulevard, as proposed by the City, viaducts will have to be constructed in the streets and the railroad tracks be depressed so as to pass under the streets in order to abolish the other grade crossings where the Rock Island tracks are located. By amendment to the complaint this was admitted. By the City plan now before us, affecting the Delmar crossing only, the tracks of the Wabash are left at their present grade at Delmar Boulevard, and also at all other places. The City viaduct will be 18 feet in the clear over the tracks.

There are to be approaches thereto of earth embankments, with retaining walls. The grade of the approaches is two and one-half per cent and each is about 750 feet in length. The testimony of the City engineers was that the construction of the viaduct and approaches as proposed by complainant at Delmar Boulevard would be \$466,900, and of a contractor, who testified for complainant, about \$10,000, more. That the damages to private property by the change in the grade of streets caused by the construction of said approaches and viaduct would be \$61,756.79, making a total cost \$528,000 to \$538,000, in round numbers. The estimate of the witnesses for the Wabash for the same work was \$958,000. In the Wabash estimate is included \$57,000 for the relocation of Delmar Boulevard, during the construction of the approaches and viaduct. Also \$181,000 for legal expenses and property damages. The railroad also estimated embankment to cost \$1.10 per cubic yard, while the City allowed 70 cents. The railroad also figured \$40,000 for "Barrow Pit," and \$55,000 for expense of the telephone company in adjusting its poles and \$31,000 for the expense to the street railway for relaying its tracks. All these items the City omitted from its estimate and criticizes as either too high or not proper items to be included.

The Wabash plan for the Delmar crossing required the railroad to elevate its tracks at Delmar, 21 feet, which would require an [fol. 1052] elevation at the next street south, Hamilton Avenue, of 22 feet, with approaches beginning at De Baliviere Avenue, on the south, and at Olive Street Road, on the north, said approaches having a grade of one per cent. This plan abolishes two grade crossings, the one at Delmar Boulevard and the other at Hamilton Avenue. The estimate of the Wabash of the cost of its plan is \$670,000, which exceeds the City's estimate of the cost of the City plan for the overhead viaduct at Delmar by \$131,000, but is less than the railroad's estimate of the cost of that viaduct by \$287,000.

The City strenuously objects to the Wabash plan of abolishing the grade crossing at Delmar Boulevard, because its embankment destroys the value of much private property without recompense, by defacing the landscape, because it requires the abolition of all other grade crossings south of Delmar to the Kingshighway to be made by raising the railroad embankment for over a mile through a most beautiful residential district from Lindell north to Delmar Boulevard, which will mar the beauty of said district and seriously decrease its value without redress on the part of the property owners, as well as obstruct their view of Forest Park and mar the beauty of Forest Park by destroying the attractiveness of the surrounding neighborhood and continuing and increasing its present embankment in said Park. There was much evidence by property owners and expert real estate men sustaining this view.

The City's complete plan provides for a depression of the railroad tracks all the way from Delmar Boulevard to Kingshighway through Forest Park so that the cars will run in a cut and not be visible for the most part, and there will be artistic viaducts and approaches to such viaducts over the tracks where they cross the

streets. The viaducts will have a clearance of 18 feet above the tracks. The embankment on which the railroad now runs through Forest Park will be removed and a depression in the right of way take its place. The cut, or depression, will have sloping sides towards the tracks and sloping banks about 17 feet high, away from them [fol. 1053] which will be sodded and beautified with shrubbery and trees and thus practically hide the railroad tracks and trains from view in a pleasant valley or sunken garden. The bridge now over Grand Drive, which carries the railroad overhead above that Boulevard in the Park, will be taken down and a viaduct will be constructed in said Drive over the tracks below. North of Delmar, under the City plan, as well as the Wabash plan, the tracks will be elevated and run over the streets, to and beyond the City limits, but the embankment of the City plan is much less in height for some distance than that of the Wabash plan. The complete plan of the City also calls for a change in the location of the Wabash tracks in Forest Park between Kingshighway and Union and Lindell Boulevards, by moving them about 50 feet south of their present location until they approach the intersection of Union and Lindell Boulevards, where they would have to be moved 150 feet south. The Wabash right of way outside of Forest Park is from 55 to 60 feet wide and within the Park, 42 feet. The City owns title to two strips of ground 22 feet wide along the Wabash right of way north of the Park from Delmar to De Baliviere Boulevards, which, added to the present right of way of the Wabash, would make it 100 feet wide between these points. Just west of Union near Lindell Boulevard, on the north line of the Park, it will be necessary to acquire additional land (less than one acre) to change the location of the tracks of both railroads at that point required by the City complete plan, but the City has an option on the necessary land. With this land of the City added to the present railroad right of way, there will be a right of way 100 feet wide from Delmar Boulevard through Forest Park to Kingshighway, which will be sufficient for four tracks. At present the Wabash has but two tracks and leases one track from the Rock Island outside and north of the Park. Both the City plan and the Wabash plan contemplate four tracks. The City's estimate of the cost of its complete plan of abolishing all grade crossings south of Delmar Boulevard, as to the Wabash Railroad, was \$1,840,000, and as estimated by the [fol. 1054] Wabash engineers for the same work, \$3,000,000, but there are items contained in the railroad estimate which the City controverts and which, if eliminated, would reduce the railroads estimated to \$2,000,000.

The track elevation plan of the Wabash to abolish all said grade crossings would carry the tracks over all the streets, leave the streets and public utility facilities therein, and sewers undisturbed, and not effect private property except as the embankment it proposes damages it and obstructs the view and disfigures the beautiful residence neighborhood and Park through which it would pass. The tracks would be elevated about 22 feet above the surrounding property, but

the proposed bridges over the streets would be ornamental and the slopes of the embankments sodded and beautified with shrubbery.

The Des Peres River, a small stream in dry weather, but doing considerable damage at flood tide, runs southeasterly in the vicinity of, and at several places quite near, the railroad, and much evidence in the record bears on the damage that river may do when it overflows if the City plan or Wabash plan be adopted. But the majority opinion of the Commission disards that testimony and we think properly, as unimportant, because the City of St. Louis has voted bonds to build a public sewer in which to confine said stream, which practically eliminates it from the case.

The clearance of only 18 feet for trains under the proposed viaducts of the City will not permit employees of the railroad to stand upon the top of the highest cars, and therefore there is danger of their being killed or injured while so doing. But Kingshighway tunnel, through which all Wabash and Rock Island trains pass, has only a clearance for trains of 17.3 feet, and the St. Charles road bridge on the Wabash practically the same clearance as the proposed City viaducts, to-wit, 18.4 feet. It is also shown in evidence that an 18 foot clearance is quite common, although a clearance of more than 18 feet is desirable when feasible by the railroads. In this case, however, the City plan does not admit of a greater clearance than 18 feet, which the weight of the evidence shows is reasonable and practicable, especially in view of the clearance of 17.3 feet in the Kingshighway tunnel and 18.4 at St. Charles Road. The maximum grade of the railway tracks by the Wabash plan at Delmar, is one per cent, while the City plan on Delmar does not disturb its present grade at any point. But the maximum grade of the tracks from Kingshighway to the City limits under the City complete plan is .8 per cent, while that of the Wabash plan is .44 per cent. But at a number of places on the present line of the Wabash and near St. Louis, the grade is one per cent, and the City grade of .8 per cent is reasonable and less than the present grade of the tracks affected. The proposed cut of the City may be troubled with seepage water, but this may be cared for by proper sewerage. Under the Wabash plan, the railroad bridges will have posts or pillars in the streets which will be dangerous to travelers in automobiles, and other vehicles, but respondents suggest this is not essential to such bridges, as they may be constructed so as to span the entire street without posts or pillars. There are also posts or supports of the City viaduct in the railroad right of way, but it is shown they are so far distant from the tracks (7 feet) that there is no danger of collision with them by the cars or employees of the railroads. The approaches to all the City viaducts for its complete plan will total a length of 18,895 feet, but they start at zero and are much less in height than the 10,900 feet of embankment to be constructed by the Wabash plan, which would be 20 to 22 feet high above the surrounding territory on an average, and would constitute a much greater disfigurement of the residential district than under the City plan.

The evidence of the City tends to show that the community would be much less annoyed by smoke and noise of trains by its plan than

by the Wabash plan, but the evidence for the railroads is to the contrary. The Wabash plan would also perpetuate its grade crossing over the pedestrians way in the eastern part of the Park, which the City plan would establish. The City- complete plan would only [fol. 1056] afford room for three tracks on the existing Wabash right of way, because of the space to be occupied by retaining walls made necessary by the City cut, whereas by the Wabash embankment plan it can carry four tracks by placing one on the top of the retaining wall which may be constructed to support its embankments. But it is shown that by the City plan the right of way is to be widened under favorable conditions, the City practically having nearly all the property necessary therefor, whereby it will more readily accomodate the four tracks proposed by the Wabash than by its own plan. So while, by the City plan, the grade of the intersection of Union and Lindell Avenue will be raised somewhat by the City viaduct, the "bump" in Hamilton Avenue will be perpetuated and the Jefferson monument obscured from view by the Wabash plan.

By the City complete plan also, the railroads will cross Lindell and Union Boulevards at their junction and thus abolish one crossing entirely, as the tracks now cross both Boulevards only about 100 feet apart.

As to the Rock Island, the evidence shows that there is no substantial difference, in the cost—to it, between the City complete plan and the Wabash plan; that such difference in cost is not important and that its chief engineer stated in writing that if the Rock Island continued the use of the Wabash tracks—which the evidence shows it may not do—it had no objection to the City plan.

There are other matters of minor importance bearing on the respective merits of the two plans, but the foregoing are all that need be mentioned.

On the whole record we find in accordance with the conclusions of the Commissioners that so far as the railroads are concerned, either plan serves their purposes equally well, but that the Wabash plan would greatly injure said residential district and Park without redress, whereas the City plan reduces such injury to the minimum.

[fol. 1057]

II

Unless it clearly appears from the evidence in the record that the choice of the City Plan for eliminating the grade crossing at Delmar Boulevard, by the ruling membership of the Commission, is unreasonable, unjust, or unlawful, it is our duty under the express command of the Public Service Commission Act to refuse to set aside or avoid said order, and the burden of proof that said order is so clearly unreasonable, unjust, or unlawful, is upon the respondent Railroad Companies. (State ex rel. Case v. Public Service Commission, (this Court) 249 S. W. 1. c. 960, and cases cited. In Harrisonville v. Public Service Commission, 291 Mo. 1. c. 457, we said: "We are not concerned with the expediency or wisdom of the order made. The findings of the Commission are by statute made *prima facie* lawful, and we will ascribe to them the strength due to a judg-

ment of a tribunal created by the legislature and informed by experience. While the conclusion reached is subject to review, nevertheless if the power of the Commission has not been arbitrarily exercised * * * and if the order made is not violative of the constitution or wanting in conformity to statutory authority and is supported by substantial evidence, we accept it as final."

III

As to the reasonableness of eliminating the grade crossing at Delmar Boulevard:

Both the majority and dissenting opinions of the Commission agree that the said grade crossing is dangerous and should be eliminated. 1,400 street cars carrying 33,000 passengers, 6,000 automobiles and other vehicles, as well as 1,000 pedestrians, daily cross over said crossing, and each twenty-four hours fifteen passenger trains and six freight trains of the Wabash Railroad cross same. On one occasion a street car was struck by a train and some passengers injured and quite a number of minor accidents have occurred within the last five years. One of the Wabash experts testified that if the [fol. 1058] travel was as great as the testimony indicated, there would be a "strong probability of the necessity of eliminating that grade crossing." It is true that the Wabash Railroad maintains, and has for years maintained, gates and watchmen at said crossing and no great accidents have occurred. But all grade crossings are dangerous, and it is not unreasonable to separate the grades, at much traveled crossings in cities, such as the one we have to consider, before any great accident occurs. In *Erie R. R. Co. v. Public Utilities Commissioners*, 254 U. S. 410-12, the court said: "Grade crossings call for a necessary adjustment of two conflicting interests—that of the public using the streets and that of the railroads and the public using them. Generally the streets represent the more important interest of the two. There can be no doubt that they did when these railroads were laid out, or that the advent of automobiles has given them an additional claim to consideration. They always are the necessity of the whole public, which the railroads, vital as they are, hardly can be called to the same extent, being places to which the public is invited and that it necessarily frequents, the State, in the care of which this interest is and from which, ultimately, the railroads derive their right to occupy the land, has a constitutional right to insist that they shall not be made dangerous to the public, whatever may be the cost to the parties introducing the danger. That is one of the most obvious cases of the police power, or to put the same proposition in another form, the authority of the railroads to project their moving masses across thoroughfares must be taken to be subject to the implied limitation that it may be cut down whenever and so far as the safety of the public requires * * *."

"If we could see that the evidence plainly did not warrant a finding that the particular crossings were dangerous there might be room for the argument that the order was so unreasonable as to be void. The number of accidents shown was small and if we went upon that

alone we well might hesitate. But the situation is one that always is dangerous. The Board must be supposed to have known the locality and to have had an advantage similar to that of a Judge [fol. 1059] who sees and hears the witnesses. The Courts of the State have confirmed its judgment. The tribunals were not bound to await a collision that might cost the road a sum comparable to the cost of the change. If they were reasonably warranted in their conclusion their judgment must stand."

We hold, therefore, that the public travel was such over the grade crossing at Delmar Boulevard as to make it dangerous and it is reasonable that it should be abolished by a separation of the grade of the street from that of the railroad.

IV

The principal reason given by the dissenting Commissioner and the Circuit Court, as well as respondents, here, why the Wabash plan in preference to the City plan of elimination should be adopted at Delmar, is that by the Wabash plan, both the grade crossing at Delmar Boulevard and at Hamilton Avenue would be eliminated at a cost of \$670,000, according to the Wabash Company's estimate, whereas the elimination of the grade crossing at Delmar alone, according to the City plan, would cost \$538,000, according to the estimate of the City, and over \$200,000 more than that according to the Wabash estimate. We do not think the greater cost is so excessive as to be the controlling consideration in this case and, besides, the estimates of the Railroad do not impress us as having been made with the same care as that of the City.

The representatives of the City, both before the Commission and before us, stated that the City would guarantee the correctness of its figures, but no such offer was made by the Railroads. The Railroads cannot vicariously complain for others, and it is only if they are assessed more by the City plan than they would have been justly assessed by the Wabash plan, that they can be heard to question the cost. No other parties assessed appealed except the Wabash and the Rock Island.

[fol. 1060]

V

As to the Constitutional objections raised by respondents:

(a) It cannot be longer doubted that a railroad holds its right and title to cross or occupy the public highways upon condition that when such occupancy or use renders them dangerous to human life, the State has plenary constitutional power to require the railroads to separate the grades and to go under or over the highways, as the State may direct, and impose the entire cost of so doing upon the railroad. (*Erie R. R. Co. v. Board Public Utilities*, 254 U. S. 394; *State v. Public Service Commission*, 272 Mo. 550.)

It is said by the Supreme Court of the United States in *Erie R. R. Co. v. Public Utilities Commission*, 254 U. S. 410, the State or city representing the public from which the railroads derive their right to occupy the streets, "has a constitutional right to insist that they

shall not be made dangerous to the public, whatever may be the cost to the parties introducing the danger." In that case, no part of the expense was borne by the public and the whole cost, less a small percentage charged to Public Utilities using the streets, was imposed on the railroad of eliminating fifteen grade crossings in the City of Erie, costing the railroad more than \$2,000,000, which it could ill afford to pay, and the City was required to pay nothing. This was not regarded as an unreasonable exercise of the police power of the State.

In the recent case of *St. Louis v. Nash*, 260 S. W. 986, we said (per Woodson, J.): "V. In the exercise of police power of the state, a municipality may lawfully require a property owner to alter or reconstruct an existing building without compensation, when such alteration or reconstruction is reasonably necessary to insure the public safety or to protect the public health"—citing many cases.

(b) Nor does the fact that the grade and location of the Wabash tracks through Forest Park were made pursuant to contract between to the Park Commissioners and the Railroad, or that the Wabash has leased its tracks to the Rock Island, prevent the State from eliminating [fol. 1061] dangerous grade crossings at the expense of the railroads. The police power of the State to so require cannot be surrendered by contract or compromise. All such contracts are void. *Northern Pacific Railway v. Duluth*, 208 U. S. 583; *State ex rel v. Public Service Commission*, 271 Mo. 286; *American Tobacco Co. v. St. Louis*, 247 Mo. 433.

(c) It is true, as asserted by respondents' learned counsel, that this court has held that private property—which would include the right of way and property and moneys and funds of railroads—under our Constitution cannot be appropriated without compensation by the State merely to please the eye or gratify the æsthetic taste of the public or any part of it. (*St. Louis v. Dorr*, 145 Mo. 466; *St. Louis v. Dreisörner*, 243 Mo. 223; *State ex rel. v. McKelvey*, 256 S. W. 474; *City of St. Louis v. Evraiff*, 256 S. W. 489; *State ex rel. v. Davis*, 259 S. W. 81.)

(d) But we hold that it does not appear to our satisfaction from the evidence in this case that the order of the Commission complained of takes any of the railroads' property or funds merely to ornament or preserve the attractiveness of the neighborhood. Admitting that the City plan adopted by the Commission involves a greater expense than the Wabash plan and that the Wabash plan is all that is necessary to eliminate the grade crossing at Delmar Boulevard, and that the City plan includes expenditures for preserving or improving the attractiveness of the vicinage, not in the Wabash plan, it does not follow that the City plan will impose any greater cost on the Wabash than the Wabash plan itself, because constitutionally the whole cost of the Wabash plan could be imposed on the Company, whereas the order of the Commission, while adopting the City plan, only imposed 60 per cent of the cost thereof upon the Wabash Company, and a large percentage, 40 per cent thereof, on the City. Our statute, in authorizing the Commission to require the municipality to pay a just and reasonable part of the expense of eliminating grade cross-

ings, contemplated that just such controversies might arise, as the one before us, in which the City might contend for a plan that would [fol. 1062] mar and disfigure the vicinity less but more expensive than the plan proposed by the railroads. In all such cases, if otherwise reasonable and just, the statute authorizes the Commission to adopt the City plan and it can obey the Constitution by imposing upon the City such portion of the cost as to fully meet the extra expense of the City plan caused by reducing the defacement of the district to the minimum. We think this was fully done in this case by imposing 40 per cent of the cost upon the City. The carrier can only justly complain of the expense if the City plan causes it more expense than its own plan. If the Wabash plan in this case were adopted, it would, in our judgment, damage without redress, the vicinity many thousands of dollars by defacing and disfiguring it and it would not be unjust to impose the whole cost thereof upon the railroad and no part thereof upon the City.

So as to the complete plan of the City as to eliminating all grade crossings south of Delmar Boulevard through Forest Park to Kings-highway, if the cost of the City plan, which in our judgment and that of the Commission, is much less destructive of the attractiveness and value without recompense or remedy of the beautiful residence district and Forest Park, exceeds the cost of the Wabash plan, which is a matter of grave doubt in the record, the Commission has power to impose such part of the cost on the City as to absorb all the extra cost of its plan and thereby present all injustice to the railroads.

We rule there is no violation of any constitutional provisions in the order complained of in the City plan for eliminating the grade crossing in question.

All things considered, we hold that while the City plan at Delmar is, perhaps, not so entirely perfect and desirable as the railroad plan for its purposes, we cannot see that there is any substantial difference to the railroad which plan is adopted, except as to the cost. We hold the Wabash plan is destructive of the interests of a large number of people in the vicinity who would be left without redress, as well as [fol. 1063] to the general public, by impairing and marring the beauty of perhaps the most attractive residential district and Park in the City of St. Louis. While, therefore, the City plan is or may be substantially more expensive than the Wabash plan, as assumed by the Commission, it does the minimum injury to the City and its inhabitants and is just to all concerned. Any injustice to the railroad on account of its greater cost is fully met in our judgment by the imposition of 40 per cent of the cost upon the City of St. Louis, by the order of the majority of the Commission.

VI

While it is necessary that railroads be operated through Forest Park, public policy, justice and reason demand that they should be so constructed therein as to deface the Park and endanger its use by the public as little as possible.

In *Joy v. St. Louis*, 138 U. S. 7, the Court held that under the contract between the Wabash Railroad and the City of St. Louis, as

to its right of way through Forest Park, the provision that the Wabash should permit other railroads to "use its right of way" on such just terms as might be agreed upon, required it to permit such other companies to use its tracks and they were not required to build and lay separate tracks of their own on the Wabash right of way, as contended by that company. Among other things, the court said that such provision in the contract was inserted because, (page 42) "it was feared that the invasion of the Park by railroads would not only affect unfavorably the landscape beauty of the Park but would also produce great danger to persons visiting it" and because it, "protected the Park and prevented its being defaced and injured by the construction of other railroads through it." On page 50, the Court said: "Here is a great, public Park (1379 acres) one of the lungs of an important City which, in order to maintain its usefulness as a Park, must be as free as possible from being serrated by railroads, and yet the interests of the public demand that it shall be crossed by [fol. 1064] a railroad. But the evil consequences are to — reduced to a minimum by a single right of way and a set of single tracks to be used by all railroads which desire to cross the Park. These two antagonisms must be reconciled and that can only be done by the interposition of a court of equity, which thus will be exercising one of its most beneficent functions."

The same may be said as to our Public Service Commission. It exercises one of its most beneficent functions when it reconciles the antagonisms between the public and the railroads, by providing for eliminating grade crossings in such manner as to mar and deface the beautiful residential districts and parks of a city as little as possible, taking into consideration the extra cost of so doing, if any, in fixing the share of the cost the municipality is to pay.

VII

The point made by respondents that Section 10459 R. S. 1919 (Par. 2 of Sec. 50 of the original act) does not give the Public Service Commission power to determine the manner or plans of eliminating grade crossings, or whether it shall be by the railroad passing under or over the street, as the Commission may determine, is not well taken. We have decided to the contrary and that under said Section, the Commission has full power and authority to determine the manner, as well as the terms under which grade separations shall be made. (State ex rel. v. Public Service Commission, 271 Mo. 283-84.) There is nothing in State ex rel. v. Public Service Commission, 257 S. W. 462, to support respondents' contention. That case recognized the right of the Commission to determine the manner of such grade separations. The Court said, page 465: "Let it be granted that the manner in which a street or road crossing is to be installed, used, and maintained has been delegated to the Public Service Commission. The right in the first instance to grant or refuse this privilege—(to cross the street)—has been reserved to the municipal authorities. That this division of the police power has been wisely determined no one familiar with the organization of [fol. 1065] cities and counties * * * will deny."

So public good and common justice demands that grade crossings should be eliminated in such manner as to disfigure the surrounding neighborhood to a minimum degree, which can be justly and constitutionally done by imposing the extra cost, if any on the City, as was done by the Commission in our judgment, in the order of the Commission which imposed 40 per cent of the cost of the City's Delmar crossing plan on the City.

VIII

The requirement of the City complete plan that the Wabash remove its tracks about 50 feet in Forest Park and about 150 feet at Union and Lindell Boulevards is for the purpose of, and is incident to, the elimination of all dangerous grade crossings south of Delmar Boulevard to Kingshighway. The City owns all the land, including the land in Forest Park necessary to relocate the tracks, and has an option on the land necessary to be acquired at Lindell and Union Boulevards. Besides, the railroads have the power of condemnation and could constitutionally be required to exercise that power, if necessary, to carry out the complete City plan if ordered by the Commission.

Our statute not only gives the Commission express authority to determine the manner and terms of separating grades, but expressly gives the Commission all authority necessary to carry out its express powers. Section 10412, R. S. 1919, provides: "Said Commission shall possess all the powers and duties in this chapter specified and also all powers necessary or proper to enable it to carry out fully and effectually all the purposes of this chapter." The Commission therefore has full power to require the railroad to acquire additional lands or rights of way by condemnation, if necessary, and relocate its tracks in order to eliminate grade crossings to carry out just and reasonable plans adopted by the Commission for so doing. Everything supplied by the railroads and by the City, respectively, in executing the City complete plan when they come before the Commission, can be, and no doubt will be, taken into account by the Commission in determining the share of the [fol. 1066] cost to be imposed on each.

IX

The right to determine whether, in case of a grade separation, the tracks shall go under or over the street, it is claimed, is vested in the railway company by virtue of Section 9944, R. S. 1919, relating to railroads. That Section is as follows: "Every such corporation shall construct and maintain good and sufficient crossings where its railroad crosses public roads or town streets, now or hereafter to be opened for public use. * * * Provided, that such corporation may make such road or street to pass under its said railroad where the same can be done with equal convenience and safety to the traveling public." This Section only purports to give the railroad the right to make the road or street pass under

its railroad and not over it. But we held that said Section 9944, so far as it gives railroads any right to determine the manner of crossing public streets and roads, is repealed by said Section 10459, which clearly vests in the Public Service Commission the exclusive right and power to determine and prescribe the manner each and all crossings of public roads by railroads shall be constructed, including crossings where there is a separation of grades required by the Commission. There is nothing to the contrary ruled in *State ex rel. v. Public Service Commission*, 257 S. W. 462, relied on by respondents. In that case, we held that the exclusive power to prescribe the manner of railroads crossing a street given to the Public Service Commission, did not give the Commission power to authorize a railroad to cross a street in Kansas City without the consent of the municipal authorities. Section 9850 R. S. 1919, relating to railroads, provides: "That nothing herein contained shall be construed to authorize the construction of any railroad across any street in a city * * * without the assent of the corporate authorities." That the manner of such crossing, after the city had assented to such crossing being made, was in the discretion of the Public Service Commission is clearly implied by what is said in said cause on page 164 of 257 S. W., Judge Walker then says: "Let it be granted, therefore, that the manner in which a street [fol. 1067] or road crossing is to be installed, used and maintained has been delegated to the Public Service Commission; the right in the first instance to grant or refuse this privilege has been reserved to the municipal authorities. That this division of the police power has been wisely determined no one * * * will deny."

X

It is earnestly suggested that the only constitutional justification for the exercise of the police power of the state to require railroads to eliminate grade crossings at their own expense is founded on the right of the state to protect the lives and limbs of its citizens, and that, therefore, the cheapest plan of doing so must be adopted and that the railroads cannot be required to pay for preventing the disfiguring of the district, or improving its appearance. There might be some place for this argument were the whole cost of the separation of grades imposed on the railroads. But in this case, the large percentage of the entire cost imposed on the City fully pays for the excess cost, if any, of the City plan, and therefore the argument that the order complained of requires the railroad to pay for beautifying or preventing the disfigurement of the residential district and Forest Park, along its route, is not tenable. The very purpose of giving the Public Service Commission power to require the City to pay part of the expense of eliminating grade crossings was, that its rights and that of the inhabitants of the City should pay part of the expense, which in this case was 40 per cent, besides that paid by other public utilities, so that it is unlikely that more than half the cost is imposed on the railroad. The record shows that by acquiring a small tract (which it may not even be necessary to con-

demn as the City has acquired an option to purchase it) and moving their tracks less than 100 feet south at the intersection of Union and Lindell Boulevards, the crossing will be at the junction of those Boulevards, and only one crossing there will be necessary, one under [fol. 1058] each street about a hundred feet apart. So by acquiring and using certain strips of ground which the City has already acquired, the Wabash right of way may be widened and will ultimately more readily accommodate its proposed four tracks than under its own plan and at the same time do the minimum damage to the private property in the district and to Forest Park. Forest Park belongs to the City and it can give a strip to widen the railroad right of way to aid in eliminating the grade crossings as proposed by it. (State ex rel. v. Sweickhardt, 109 Mo. 496.) The land the City furnishes can be taken into the account in fixing the amount it will have to pay.

We hold, therefore, no constitutional barriers presented to the City plans considered singly or jointly.

There was evidence that there was more or less danger from seepage of water in case the depression or cut proposed by the City larger plan is carried out, but also evidence that such seepage could be cared for by proper sewerage. By the City complete plan the grade of the tracks would be .8, which is less than the present grade, and not an unreasonable grade. By the Wabash complete plan, the maximum grade would be .44, but the advantage of this is largely neutralized by the fact that in many places in the remainder of its road, the grades are one per cent or more. The respondents also complain that the City viaducts proposed will only afford a clearance of 18 feet for the operation of their engines and cars, which is not sufficient to allow employees to stand on the top of the highest cars while passing under them. But it is enough to permit the highest engines and cars themselves to freely and safely pass and the fact that Kingshighway tunnel has only a clearance of 17 feet-3 inches, and the bridge on the Wabash at the St. Charles road crossing of only 18 feet-4 inches, and that a clearance of 18 feet is quite general, although frequently a greater clearance obtains—in our judgment makes 18 foot clearance proposed by the City for its viaducts not unreasonable. It is shown that the topography is such that a great clearance is not practicable.

[fol. 1069]

XI

It is also contended that the power of the State Public Service Commission to require the railroads to pay any part of the expense to construct the viaduct ordered by the Commission, is taken away by Section 20 (A) of the United States Transportation Act, which prevents interstate carriers, such as the Wabash and Rock Island Railroads, from issuing stocks or bonds, or extending their main lines without the approval of the Interstate Commerce Commission. That in Railroad Commission of California v. Southern Pacific R. R., decided by the United States Supreme Court, on April 7, 1924, it was held, Taft, C. J., delivering the opinion, that a new union

station to be constructed by the interstate railroads in Los Angeles, California, among other things, eliminating many grade crossings, and costing from \$25,000,000 to \$45,000,000, could not be required to be built by the State Public Utilities Commission of California, because it would require the issue of stocks and bonds by such railroads, which could only be issued with the consent of the Interstate Commerce Commission, and would also require the extension of the main lines of such railroads, without a certificate of approval from said Interstate Commerce Commission, all contrary to said Transportation Act of 1920.

In the case before us, it is not alleged, and the evidence does not show, that the expense of elimination of the grade crossing at Delmar Boulevard is so great as to require an issue of stocks or bonds by the defendant railroad or railroads, or that their main lines are required to be extended. We think the contrary is true.

But Chief Justice Taft also says in his opinion: "One might, too, readily conceive of railroad crossings or connections of interstate carriers in which the exercise by a state Commission of the power to direct the construction of merely local union stations or terminals without extensions of main tracks and substantial capital outlay should be regarded as an ordinary exercise of the police power of the state for public convenience and would not trench upon the power and supervision of the Interstate Commerce Commission in [fol. 1070] securing proper regulation of an interchange of interstate traffic or passengers." In our judgment, the elimination of the grade crossing sought in this case comes within the above suggestions of the learned Chief Justice, as one of a local character and involves only the ordinary exercise of the police power of the state for public convenience and safety, and the cost thereof is not so great as to trench upon the powers of the Interstate Commerce Commission conferred by the Transportation Act. That Act does not expressly nor by implication, give the Interstate Commerce Commission power to eliminate grade crossings, nor prohibit the State authorities from so doing. There is no conflict between the recent case decided by Chief Justice Taft, and the case of *Erie R. R. Co. v. Public Utilities Commission*, 245 U. S. 395, which holds the state had power to order the elimination of grade crossings at the expense of railroads and that this in no manner brings the state's order in conflict with any provision of the Federal Constitution or interferes with interstate commerce.

XII

Both parties have assumed that no property owners adjoining the railroad right of way can legally recover damage for injury to the value of their property on account of the cut or depression in such right of way contemplated by the Wabash plan, except where the grade of streets is changed, either lowered or elevated, adjacent to such property. We do not wish to be understood as either consenting to or denying that view. We cannot pass on that question in this case and do not pass on it. But whether that assumption is

true or not, we think by far the greater damage to private property in the district, whether adjacent to the railroad or not, will be done by the Wabash embankment plan.

In our judgment, the order of the majority of the Commission was lawful, reasonable, and just. Accordingly, we reverse the judgment of the Circuit Court and direct it to affirm the order of the majority of the Public Service Commission herein.

Charles E. Small, Commissioner.

[fols. 1071 & 1072] Lindsay, C., concurs.

PER CURIAM:

The foregoing opinion was prepared by our late Commissioner Charles E. Small. It is hereby adopted as the opinion of the Court. All the Judges concur, except James T. Blair, not sitting.

[fols. 1073-1095] Petition for rehearing, covering 23 pages, filed Dec. 5, 1924, omitted from this print.

[fol. 1096] IN SUPREME COURT OF MISSOURI, DIVISION NO. 1

No. 25086

[Title omitted]

NOTICE OF MOTION TO TRANSFER CAUSE TO COURT EN BANC—Filed
Dec. 5, 1924

To Public Service Commission of Missouri, Henry W. Kiel, Mayor of the City of St. Louis; City of St. Louis, Missouri, West End Grade Crossing Association, Frank H. Gerhardt, appellants, or their respective attorneys of record:

You, and each of you, are hereby notified that the above named respondents will, on Friday, December 5th, 1924, file in the Supreme Court of Missouri their motion to transfer this cause from said Division No. 1 to the Court En Banc.

A copy of the motion so to be filed is attached hereto and made a part hereof.

N. S. Brown, L. H. Strasser, Homer Hall, Luther Burns,
Attorneys for Respondents.

St. Louis, Mo., December 4, 1924.

Service of copy of the foregoing notice, together with copy of motion to transfer the above entitled cause to the Court En Banc is hereby acknowledged.

L. H. Breuer (by Oliver Senti), Attorney for Public Service Commission. Oliver Senti, Attorney for Henry W. Kiel, Mayor, etc. Oliver Senti, Attorney for City of St. Louis, Mo., Lawrence McDaniel, Attorney for West End Grade Crossing Association. M. C. Early & Irvin Lodge, Attorneys for Frank H. Gerhardt.

[fol. 1097] IN SUPREME COURT OF MISSOURI, DIVISION NO. 1

No. 25086

[Title omitted]

MOTION TO TRANSFER CAUSE TO COURT EN BANC

Come now the Respondents in the above entitled cause, and present their motion that an order be entered in Division No. 1 of this Court, transferring this cause to the Court En Banc, for the reason that Federal questions are involved in the decision and disposition of the case.

In support of the Motion, Respondents respectfully show unto the Court as follows:

Section IV of the Amendment of 1890 to the Constitution of Missouri, provides that when a Federal question is involved, the cause, on application of the losing party, shall be transferred to the Court in Banc for its decision. Numerous Federal questions are involved in this case, all of which are set forth in the answers filed by Respondents before the Public Service Commission of Missouri in this proceeding, and in Respondent's Petition or Motion for Rehearing filed with said Commission, and in the Briefs of Respondents filed in Division No. 1 of this Court.

[fol. 1098] Reference is made to the answer of Respondent, Chicago, Rock Island and Pacific Railroad Company, pages 55, 56, 57, 58, 60 and 61 of the Record; also to the Answer of Respondent Wabash Railway Company, at pages 35, 36, 37, 38, 41 and 42 of the Record; also to the Petition or Motion for Rehearing filed before the Commission, and set out at pages 992, 993, 994, 996, 997 and 998 of the Record.

Respondents further show unto the Court that a decision of the Federal and Constitutional questions, and of the construction of the Federal Transportation Act of 1920 are necessarily involved in the proper decision of this case, and that some of said Federal questions have been passed upon by Division No. 1 of this Court in its Opinion herein.

Wherefore, by virtue of the above mentioned Constitutional requirements of this case said Respondents move that an order may be entered transferring this cause to the Court En Banc.

N. S. Brown, L. H. Strasser, Homer Hall, Luther Burns,
Attorneys for Respondents.

[fol. 1099] IN SUPREME COURT OF MISSOURI, DIVISION No. 1

No. 25086

[Title omitted]

ORDER OVERRULING MOTIONS FOR REHEARING AND TO TRANSFER
CAUSE TO COURT EN BANC—Dec. 19, 1924

Now, at this day, the Court having considered the motion of the said respondents for a rehearing herein, doth order that said motion be, and the same is hereby, overruled.

Now, at this day, the Court having considered the motion of the said respondents to transfer this cause to Court en Banc, doth order that said motion be, and the same is hereby, overruled.

[fol. 1100] IN SUPREME COURT OF MISSOURI

STATE OF MISSOURI at the Relation to and Use of WABASH RAILWAY
Company and Chicago, Rock Island and Pacific Railway Company
(Respondents), Plaintiffs in Error,

vs.

PUBLIC SERVICE COMMISSION of MISSOURI and JOHN A. KURTZ, E.
J. Bean, Noah W. Simpson, and A. J. O'Reilly, Members of said
Public Service Commission of Missouri; Henry W. Kiel, Mayor,
and The City of St. Louis, Missouri; C. H. Rodehaver, Samuel J.
Keiffer, West End Grade Crossing Association, and F. H. Gerhart
(Appellants), Defendants in Error.

PETITION FOR WRIT OF ERROR—Filed March 12, 1925

To the Honorable Walter W. Graves, Chief Justice of the Supreme
Court of the State of Missouri:

Now comes Wabash Railway Company and Chicago, Rock Island
& Pacific Railway Company, the above named Relators and Respond-
ents, by their respective Attorneys, and complain and allege that in
the above entitled cause, on the 19th day of December, 1924, final
judgment was rendered against your petitioners by the Supreme
Court of the State of Missouri, that being the highest Court of Law
and Equity in said State, wherein it was adjudged that the report
and order of the Public Service Commission of the State of Missouri
in the case before said Commission, wherein Henry W. Kiel, Mayor
of the City of St. Louis, was complainant, and your petitioners and
the City of St. Louis, Missouri, were defendants, are not in conflict
with Section I of Article XIV of the Amendments to the Constitu-
tion of the United States, in that said report and order of said Com-
mission do not abridge the privileges or immunities of your peti-

tioners and do not deprive your petitioners of their respective properties without due process of law and do not deny your respective petitioners the equal protection of the laws; and that said report and [fol. 1101] order of said Commission are not in conflict with Article V of the Amendments to the Constitution of the United States, in that said report and order do not deprive your petitioners of their property without due process of law and do not require or constitute a taking of the properties of your respective petitioners without due compensation; and that said report and order of said Commission are not in conflict with Section 10 of Article I of the Constitution of the United States, in that said report and order do not impair the obligations of the contracts existing between the State of Missouri and petitioner, Wabash Railway Company, and between the Commissioners of Forest Park of the City of St. Louis and said petitioner, as said contracts are set forth in the record in this cause.

It was also adjudged by said Supreme Court, by its said final judgment in the above entitled cause, that the said report and order of said Commission are not in conflict with Article V and Section I of Article XIV of the Amendments to the Constitution of the United States, in that they do not deprive your petitioners, respectively, of their properties, rights, privileges and immunities under the decree of the Supreme Court of the United States made and entered in the case of *Joy vs. City of St. Louis*, (138 U. S. 1).

It was also adjudged by said Supreme Court, by its said final judgment in the above entitled cause, that the said report and order of said Commission are not in conflict with the provisions of the Act of Congress of the United States, approved February 28, 1920, and commonly known as "The Transportation Act of 1920," in requiring your petitioner, Wabash Railway Company, without the approval and authority of the Interstate Commerce Commission, to abandon its present right-of-way and line of railroad through Forest Park in said City of St. Louis, and in requiring your said petitioner to acquire, construct and operate another line of railroad upon a different location through said Park; and in requiring your petitioner, Chicago, Rock Island & Pacific Railway Company, without the approval and authority of the Interstate Commerce Commission, to abandon its line of railroad for a distance of approximately three-fourths ($3/4$) of a mile and extending from Union Avenue to De Baliviere Avenue in said City of St. Louis, and thereby depriving [fol. 1102] said petitioner of its only entrance for its railroad into the said City of St. Louis.

It was further adjudged by said Supreme Court, by its said final judgment in the above entitled cause that the said report and order of said Commission are not in conflict with Section 20a of the Interstate Commerce Act, as amended by the said Transportation Act, in that your petitioners are not required to issue any stocks, bonds or other securities for financing the reconstruction of their respective railroads and carrying out the grade separation work as required by said report and order. That all of the foregoing matters appear in the record, opinion and final judgment of said Supreme Court of the State of Missouri, entered as aforesaid, and in detail from the

assignment of errors filed herewith, whereby manifest error has happened to the great damage of your petitioners.

Wherefore, your petitioners pray for the allowance of a Writ of Error from the Supreme Court of the United States to the Supreme Court of the State of Missouri and the Judges thereof, to the end that the record in the above entitled cause may be removed into the Supreme Court of the United States, and the errors complained of by your petitioners may be examined and corrected and said judgment reversed; and your petitioners will ever pray.

Wabash Railway Company, by Homer Hall, N. S. Brown,
Its Attorneys. Chicago, Rock Island & Pacific Railway
Company, by M. L. Bell, W. F. Dickinson, Luther Burns,
Its Attorneys.

The Writ of Error as prayed for in the foregoing petition is hereby allowed this 12th day of March, 1925, and the bond for that purpose is fixed in the sum of \$5,000.00.

Dated at Jefferson City, Missouri, this 12th day of March, 1925.

W. W. Graves, Chief Justice Supreme Court of the State of
Missouri.

[fol. 1102½] [File endorsement omitted.]

[fol. 1103] IN SUPREME COURT OF MISSOURI

No. 25086

[Title omitted]

ORDER ALLOWING WRIT OF ERROR—Filed March 12, 1925

The petition of the said respondents for the allowance of a writ of error herein from the Supreme Court of the United States to the Supreme Court of the State of Missouri, assignment of errors, and bond for the prosecution of said writ of error, having been presented to the undersigned Chief Justice of the Supreme Court of Missouri: Upon examination and consideration whereof and of the record in said cause, the said writ of error is hereby allowed, and the said bond, in the sum of five thousand dollars (\$5,000.00), executed by Wabash Railway Company and Chicago, Rock Island and Pacific Railway Company, as principals, and American Surety Company of New York, as surety, is approved, this 12th day of March, 1925.

W. W. Graves, Chief Justice of the Supreme Court of the
State of Missouri.

[File endorsement omitted.]

[fol. 1104] IN SUPREME COURT OF MISSOURI

STATE OF MISSOURI at the Relation to and Use of WABASH RAILWAY COMPANY and Chicago, Rock Island and Pacific Railway Company, Plaintiffs in Error,

vs.

PUBLIC SERVICE COMMISSION OF MISSOURI and JOHN A. KURTZ, E. J. Bean, Noah W. Simpson, and A. J. O'Reilly Members of said Public Service Commission of Missouri; Henry W. Kiel, Mayor, and The City of St. Louis, Missouri, C. H. Rodehaver, Samuel J. Keiffer, West End Grade Crossing Association, and F. H. Gerhart, Defendants in Error

ASSIGNMENTS OF ERROR—Filed March 12, 1925

Now come the above named plaintiffs in error and respectfully submit that in the record, proceedings, decision and final judgment of the Supreme Court of the State of Missouri, in the above entitled cause, there is manifest error in this, to wit:

First. The said Supreme Court erred in holding that the report and order of the Public Service Commission of the State of Missouri in the case before said Commission, wherein Henry W. Kiel, Mayor of the City of St. Louis, was complainant, and Plaintiffs in Error and the City of St. Louis, Missouri, were defendants, are not in conflict with Section I of Article XIV of the Amendments to the Constitution of the United States in that (1) said report and order of said Commission do not abridge the privileges and immunities of plaintiffs in error, and (2) do not deprive plaintiffs in error of their respective properties without due process of law, and (3) do not deny to plaintiffs in error the equal protection of the laws.

Second. The said Supreme Court erred in holding that the said report and order of said Commission are not in conflict with Article V of the Amendments to the Constitution of the United States in that (1) said report and order do not deprive plaintiffs in error of [fol. 1105] their respective properties without due process of law, and (2) do not require or constitute a taking of the respective properties of plaintiffs in error without due compensation.

Third. The said Supreme Court erred in holding that the said report and order of said Commission are not in conflict with Section 10 of Article I of the Constitution of the United States, in that (1) said report and order do not impair the obligations of the contract existing between the State of Missouri and plaintiff in error, Wabash Railway Company, and between the Commissioners of Forest Park of the City of St. Louis and said plaintiff in error, as said contracts are set forth in the record in this cause.

Fourth. The said Supreme Court erred in holding that said report and order of said Commission are not in conflict with Article V and Section I of Article XIV of the Amendments to the Constitution of

the United States in that (1) they do not deprive plaintiffs in error of their respective properties, rights, privileges and immunities under the decree of the Supreme Court of the United States, made and entered in the case of *Joy vs. City of St. Louis*, (138 U. S. 1), and (2) do not impair the obligations of the contract existing between plaintiffs in error, arising and growing out of the provisions of said decree of said Supreme Court.

Fifth. The said Supreme Court erred in holding that the said report and order of said Commission are not in conflict with the provisions of the Act of Congress of the United States, approved February 28, 1920, and commonly known as "The Transportation Act of 1920," (1) in requiring plaintiff in error, Wabash Railway Company, without the approval and authority of the Interstate Commerce Commission, to abandon its present right-of-way and line of railroad, approximately one-half ($\frac{1}{2}$) mile in length, through Forest Park of the City of St. Louis, and (2) in requiring said plaintiff in error, Wabash Railway Company, to acquire, construct and operate another line of railroad upon a different location through said Park, and (3) in requiring plaintiff in error, Chicago, Rock Island & Pacific Railway Company, without the approval and authority of the Interstate Commerce Commission, to abandon its line of railroad for a distance of approximately three-fourths ($\frac{3}{4}$) of a mile and extending from Union Avenue to De Baliviere Avenue in said City [fol. 1106] of St. Louis, thereby depriving said plaintiff in error of its only entrance for its railroad into the City of St. Louis.

Sixth. The said Supreme Court erred in holding that the said report and order of said Commission are not in conflict with Section 20a of the Interstate Commerce Act, as amended by said Transportation Act, in that plaintiffs in error, or either of them, are not required to issue any stocks, bonds or other securities for financing the reconstruction of their respective railroads and carrying out the grade separation work as required by the provisions of said report and order of said Commission.

Seventh. The said Supreme Court erred in holding that said report and order of said Commission are not unreasonable, arbitrary and unlawful under the provisions of the Constitution of the United States.

Wherefore, the said plaintiffs in error pray that the judgment and decision aforesaid may be reversed, annulled and for naught held, and the plaintiffs in error may be restored to all things which they have lost by the action and because of said judgment and decision.

Homer Hall, N. S. Brown, Luther Burns, Attorneys for
Plaintiffs in Error.

[fol. 1106½] [File endorsement omitted.]

[fols. 1107-1109] BOND ON WRIT OF ERROR FOR \$5,000.00—Approved; omitted in printing

[fol. 1110] IN SUPREME COURT OF MISSOURI

WRIT OF ERROR—Filed March 12 1925

UNITED STATES OF AMERICA:

The President of the United States of America to the Honorable the Judges of the Supreme Court of the State of Missouri, Greeting:

Because, in the record and proceedings, as also in the rendition of the judgment of a plea which is in the Supreme Court of the State of Missouri, before you, between State of Missouri, at the Relation to and Use of Wabash Railway Company and Chicago, Rock Island and Pacific Railway Company, plaintiffs in error, and Public Service Commission of Missouri and John A. Kurtz, E. J. Bean, Noah W. Simpson and A. J. O'Reilly, Members of said Public Service Commission of Missouri, Henry W. Kiel, Mayor of the City of St. Louis, Missouri, C. H. Rodehaver, Samuel J. Keiffer, West End Grade Crossing Association and F. H. Gerhart, defendants in error, wherein was drawn in question the validity of a treaty or statute of, or an authority exercised under the United States, and the decision was against their validity; or wherein was drawn in question the validity of a statute of, or an authority exercised under said State, on the ground of their being repugnant to the Constitution, treaties, or laws of the United States, and the decision was in favor of their validity, or wherein was drawn in question the validity of a statute of, or an authority exercised under said State, on the ground of their being repugnant to the Constitution, treaties or laws of the United States, and the decision was in favor of their validity, a manifest error has happened to the great damage of said plaintiffs in error, as by said complaint appears, and we being willing that error, if any hath been, shall be corrected, and full and speedy justice be done to the parties aforesaid in this behalf, do command you, if judgment be therein given, that then under your seal, distinctly and openly, you send the record and proceedings aforesaid, with all things concerning the same, to the Supreme Court of the United States, together with this writ, so that you have the same in the Supreme Court at Washington, within [fol. 1111] thirty (30) days from the date hereof; that the record and proceedings aforesaid being inspected, the said Supreme Court may cause further to be done therein to correct that error, what of right and according to the laws and customs of the United States should be done.

Witness The Honorable William H. Taft, Chief Justice of the

United States, this 12 day of March, in the year of Our Lord One Thousand Nine Hundred and Twenty Five.

Edwin R. Durham, Clerk of the United States District Court, Western District of Missouri, by F. J. Fromence, D. C. (Seal of the United States District Court of Missouri, Central Division, Western District.)

The above Writ is allowed by W. W. Graves, Chief Justice of the Supreme Court of the State of Missouri.

[File endorsement omitted.]

[fol. 1112] CITATION—In usual form, showing service on L. H. Breuer et al.; filed March 17, 1925; omitted in printing

[fols. 1112½-1114] [File endorsement omitted.]

[fols. 1115 & 1116] IN SUPREME COURT OF MISSOURI

CLERK'S CERTIFICATE

I, J. D. Allen, Clerk of the Supreme Court of the State of Missouri, in obedience to the mandate of the writ of error herein, and as directed by the præcipe for transcript, herewith transmit to the Honorable Supreme Court of the United States a true and complete transcript of the record and proceedings in a cause between State of Missouri, at the Relation to and Use of the Wabash Railway Company and Chicago, Rock Island and Pacific Railroad Company, Respondents, and Public Service Commission of Missouri and John A. Kurtz, E. J. Bean, Noah W. Simpson, and A. J. O'Reilly, Members of said Public Service Commission, and Henry W. Kiel, Mayor, City of St. Louis, Missouri, Appellants, No. 25,086, and in a cause between State of Missouri, at the Relation to and Use of the Wabash Railway Company and Chicago, Rock Island and Pacific Railroad Company, Respondents, and C. H. Rodehaver, Samuel J. Keiffer and West End Grade Crossing Association, Interveners, Appellants, No. 25,087, and in a cause between State of Missouri, at the Relation to and Use of the Wabash Railway Company and Chicago, Rock Island and Pacific Railroad Company, Respondents, and F. H. Gerhart, Appellant, No. 25,088, so far as called for by the said præcipe, and as fully as the said record and proceedings, so called for, appear of record and on file in my office; and I also herewith transmit to the Honorable Supreme Court of the United States, as directed by the said præcipe, the exhibits transmitted to the Supreme Court of Missouri from the Circuit Court of Cole County, Missouri, pursuant to the stipulation of counsel, filed in said cause.

In Testimony Whereof, I hereunto set my hand and affix the seal

of said Supreme Court, at my office in the City of Jefferson, State aforesaid, this 7th day of April, 1925.

J. D. Allen, Clerk of the Supreme Court of the State of Missouri. (Seal of the Supreme Court of Missouri.)

[fol. 1117] IN SUPREME COURT OF THE UNITED STATES, OCTOBER TERM, 1924

STATEMENT OF POINTS TO BE RELIED UPON AND DESIGNATION BY PLAINTIFFS IN ERROR OF PARTS OF RECORD TO BE PRINTED—Filed May 4, 1925.

To the above-named defendants in error and L. H. Brewer, Esq., Attorney for Public Service Commission of Missouri, and the members thereof; Oliver Senti, Esq., attorney for Henry W. Kiel, mayor, and the City of St. Louis, Lawrence McDaniel, Esq., attorney for C. H. Rodehaver, Samuel J. Keiffer, and West End Grade Crossing Association, and M. C. Early, Esq., attorney for F. H. Gerhart:

You are hereby notified that the above named plaintiffs in error will file with the Clerk of the Supreme Court of the United States on or before May 5, 1925, a statement of the points on which they intend to rely and a statement of the parts of the record which they think necessary for the consideration thereof upon the trial and hearing of said cause in said court, copies of which statements are hereto attached.

Dated May 2, 1925.

N. S. Brown, Homer Hall, Luther Burns, Attorneys for Plaintiffs in Error.

Due service of the foregoing notice and of the statement of the points on which plaintiffs in error intend to rely and of the statement of the parts of the record which they think necessary for the consideration thereof is hereby acknowledged on behalf of the defendants in error.

L. H. Brewer, Attorney for Public Service Commission of Missouri and John A. Kurtz, E. J. Bean, Noah W. Simpson, and A. J. O'Reilly, Members of said Commission, Oliver Senti, Attorney for Henry W. Kiel, Mayor, and the City of St. Louis, Missouri, Lawrence McDaniel, Attorney for C. H. Rodehaver, Samuel J. Keiffer, and West End Grade Crossing Association, M. C. Early, Attorney for F. H. Gerhart.

[fol. 1118] Statements of Points on Which Plaintiffs in Error Intend to Rely

Plaintiffs in error intend to rely upon the following points, to wit:

I

The Supreme Court of Missouri erred in holding that the report and order of the Public Service Commission of the State of Missouri in the case before said Commission wherein Henry W. Kiel, Mayor of the City of St. Louis, was complainant, and the plaintiffs in error above named, the City of St. Louis, Missouri, and others were defendants, being the report and order in issue in this cause, are not in conflict with Section 1 of Article XIV of the Amendments to the Constitution of the United States, in that (1) said report and order of said Commission do not abridge the privileges and immunities of plaintiffs in error, and (2) do not deprive plaintiffs in error of their respective properties without due process of law, and (3) do not deny to plaintiffs in error the equal protection of the laws, which privileges, immunities, rights and protection are guaranteed to plaintiffs in error under said provisions of the Constitution of the United States.

[fol. 1119]

II

The Supreme Court of Missouri erred in holding that the said report and order of the Public Service Commission of the State of Missouri are not in conflict with Article V of the Amendments to the Constitution of the United States, in that (1) said report and order do not deprive plaintiffs in error of their respective properties without due process of law, and (2) do not require or constitute a taking of the respective properties of plaintiffs in error without just compensation, which rights, privileges and immunities are guaranteed to the plaintiffs in error by said provisions of the Constitution of the United States.

III

The Supreme Court of Missouri erred in holding that the said report and order of said Public Service Commission of Missouri are not in conflict with Section 10 of Article I of the Constitution of the United States, in that said report and order do not impair the obligations of the contracts existing between the State of Missouri and plaintiff in error, Wabash Railway Company, and its predecessors, and between the Commissioners of Forest Park of the City of St. Louis, Missouri, and said plaintiff in error and its predecessors as said contracts are set forth in the record in this cause.

IV

The Supreme Court of Missouri erred in holding that said report and order of the Public Service Commission of Missouri are not in conflict with Article V and Section 1 of Article XIV of the Amend-

ments to the Constitution of the United States, in that (1) they do not deprive plaintiffs in error of their respective properties, rights, privileges and immunities under the Decree of the Supreme Court of the United States made and entered in the case of *Joy v. City of St. Louis* (138 U. S. 1), and (2) do not impair the obligations of the [fol. 1120] contract existing between plaintiffs in error, arising and growing out of the provisions of said Decree of the Supreme Court.

V

The Supreme Court of Missouri erred in holding that the said report and order of the Public Service Commission of Missouri are not in conflict with the provisions of the Act of Congress of the United States, approved February 28, 1920, and commonly known as "The Transportation Act of 1920," (1) in requiring plaintiff in error, Wabash Railway Company, without the approval, authority and order of the Interstate Commerce Commission to abandon its present right of way and line of railroad, approximately one-half mile in length through Forest Park of the City of St. Louis, and (2) in requiring said plaintiff in error, Wabash Railway Company, to acquire, construct and operate another line of railroad upon a different location through said park, and (3) in requiring plaintiff in error, Chicago, Rock Island and Pacific Railway Company, without the approval, authority and order of the Interstate Commerce Commission to abandon its line of railroad for a distance of approximately three-quarters of a mile and extending from Union Avenue to De Baliviere Avenue in said City of St. Louis, thereby depriving said plaintiff in error of its only entrance for its railroad into the City of St. Louis.

VI

The Supreme Court of Missouri erred in holding that the said report and order of the Public Service Commission of Missouri are not in conflict with Section 20a of the Interstate Commerce Act, as amended by said Transportation Act, in that plaintiffs in error, or either of them, are not required to issue any stocks, bonds or other securities for financing the reconstruction of their respective railroads and carrying out the various parts of the grade separation work as [fol. 1121] required by the provisions of said report and order of said Commission.

VII

The Supreme Court of Missouri erred in holding that said report and order of the Public Service Commission of Missouri are not unreasonable, arbitrary and unlawful under the provisions of the Constitution of the United States.

VIII

The report and order of the Public Service Commission of Missouri and the opinion, judgment and decision of the Supreme Court of Missouri approving and confirming said report and order are unreasonable, arbitrary, unlawful and discriminatory, and constitute and seek to impose an unreasonable, unnecessary, arbitrary and unlawful burden upon interstate commerce and upon the plaintiffs in error as common carriers in such commerce, contrary to the provisions of Section 8 of Article I of the Constitution of the United States, which gives to Congress the exclusive power to regulate commerce among the several states.

IX

The Supreme Court of Missouri erred in reversing the judgment of the Circuit Court of Cole County, Missouri, and in holding that the report and order of the Public Service Commission of Missouri were reasonable and lawful and ought to be enforced and carried into execution.

N. S. Brown, Homer Hall, Luther Burns, Attorneys for
Plaintiffs in Error.

[fol. 1122]

Præcipe for Transcript

To William R. Stansbury, Esquire, Clerk of the Supreme Court of the United States:

You are hereby requested to incorporate and print in the transcript of the record in this cause the following, to-wit:

1. The transcript of the judgment and order granting appeal of the Circuit Court of Cole County, Missouri.

2. The printed transcript of the record filed in the Supreme Court of Missouri by the above named defendants in error, as appellants in that court.

3. The order of the Supreme Court of Missouri showing the argument and submission of the cause in that court.

4. The opinion and judgment of the Supreme Court of Missouri.

5. The motion for rehearing filed in the Supreme Court of Missouri by the above named plaintiffs in error, as respondents in that court.

6. The motion filed in the Supreme Court of Missouri to transfer the cause to the court en banc, filed by the plaintiffs in error, as respondents in that court.

7. The order of the Supreme Court of Missouri denying said motion for rehearing.

[fols. 1123 & 1124] 8. The order of the Supreme Court of Missouri denying said motion to transfer the cause to the court en banc.

9. The petition of the above named plaintiffs in error for writ of error filed in the Supreme Court of Missouri and the order of the Chief Justice of that court allowing the writ of error and fixing the bond.

10. The assignment of errors filed in the Supreme Court of Missouri by the plaintiffs in error.

11. The bond for writ of error filed by the above named plaintiffs in error and the order of the Chief Justice of the Supreme Court of Missouri approving said bond.

12. The writ of error issued out of the office of the Clerk of the United States District Court for the Western District of Missouri and filed in the Supreme Court of Missouri and the order of said court allowing said writ.

13. The citation issued out of the Supreme Court of Missouri directed to the above named defendants in error together with the acknowledgment of service thereof.

14. The order of the Supreme Court of Missouri consolidating causes No. 25086, N. 25087 and No. 25088.

15. The certificate of the Clerk of the Supreme Court of Missouri to the transcript from that court filed in this court.

The plaintiffs in error think the foregoing parts of the record are necessary for the consideration of the points upon which they intend to rely.

N. S. Brown, Homer Hall, Luther Burns, Attorneys for
Plaintiffs in Error.

[fol. 1125] [File endorsement omitted.]

Endorsed on cover: File No. 31,043. Missouri Supreme Court. Term No. 366. State of Missouri at the relation to and use of Wabash Railway Company and Chicago, Rock Island and Pacific Railway Company, plaintiffs in error, vs. Public Service Commission of Missouri and John A. Kurtz, E. J. Bean et al., etc., et al. Filed April 16th, 1925. File No. 31,043.

SUPREME COURT OF THE UNITED STATES.

No. 69.—OCTOBER TERM, 1926.

State of Missouri, <i>ex rel.</i> Wabash Railway Company and Chicago, Rock Island and Pacific Railway Company, Plain- tiffs in Error,	} In Error to the Supreme Court of the State of Missouri.
<i>vs.</i> Public Service Commission of Missouri and John A. Kurtz, E. J. Bean, et al.	

[January 10, 1927.]

Mr. Justice STONE delivered the opinion of the Court.

The mayor of St. Louis instituted a proceeding before the Public Service Commission of the State of Missouri to eliminate a grade crossing of the Wabash Railway Company at Delmar Boulevard in the City of St. Louis. The Commission ordered the Wabash Railway to abolish this grade crossing by depressing its tracks and constructing a viaduct for street traffic, with an 18 feet clearance above the tracks. This order, set aside by the Circuit Court of Cole County, was reinstated by the Supreme Court of Missouri. 306 Mo. 149. The case is here on writ of error to that court on the ground that the order results in an unconstitutional deprivation of property, impairs the obligation of contract and violates par. 18, § 1, of the Interstate Commerce Act. Jud. Code, § 237, before amended.

All the proceedings below were limited in their purpose and effect to the removal of the single grade crossing named. There is no dispute that the hazardous character of the crossing makes the separation of grades necessary. The controversy arises from the fact that the change in grade at Delmar Boulevard is the initial step in a general scheme for abolishing all grade crossings within an extensive area of the city. Both the railroad and the city have evolved comprehensive plans for grade crossing elimination. The essential difference between the two programs is that the city proposes the depression of the railroad tracks with a consequent

2 *Missouri ex rel. Wabash Ry. Co. et al. vs.*
Public Service Commission of Missouri et al.

elevation of streets spanning the tracks by viaduct, while the railroad urges the elevation of the tracks upon embankments, leaving the streets at their present level. The Delmar Boulevard crossing is so situated that the Commission's order directing depression of the railroad tracks there is a virtual, though not legal, adoption of the city plan to the extent that other crossings at grade in the vicinity can, as a practical matter, be eliminated only by depressing the tracks. The Commission, however, expressly disclaimed passing on other details of the plan. A consideration of the proposed plans is necessary for a fuller understanding of the issues involved, although our review is limited to the immediate charge at Delmar Boulevard directed by the order.

The Wabash Railway passes from Delmar Boulevard southeasterly through a residential district, thence through Forest Park. The location of its tracks within this large public park was fixed by a contract with the park commissioners. The Chicago, Rock Island and Pacific Railway Company, also a party to the proceeding, enters the city from the west, crosses the right of way of the Wabash several squares southeast of Delmar Boulevard, runs parallel with both the Wabash tracks and the northern end of Forest Park, and then joins the Wabash line, whose tracks it uses through the park to the Union Terminal. Its right to use the tracks is defined by the contract considered in *Joy v. St. Louis*, 138 U. S. 1. It is not directly affected by the Commission's order except insofar as the separation of grades at Delmar crossing amounts to an adoption of the city plan causing a change of level of the Wabash tracks at other crossings and requiring a similar change of its own.

The city plan, in its principal features, calls for the lowering of all the tracks within a cut screened from view, the relocation of the tracks within the park so that the railroad would intersect with fewer streets as it emerges from the park, and the construction of viaducts with a vertical clearance of 18 feet. The plan also provides for the depression or abandonment of part of the Rock Island's tracks, for proper safeguards to be taken to obviate the danger of flood from a neighboring stream, and the purchase of additional land to increase the width of the right of way uniformly to 100 feet within a designated area. The railroad plan makes unnecessary the change of location of the right of way in the park, but involves the construction of unsightly embankments

which would materially reduce the value of residential property in the district. Each party makes claim for its plan the advantages of safety, economy, numerous mechanical and engineering conveniences and the avoidance of certain mechanical and engineering hazards, all or most of which, it is insisted, the other lacks. The Commission found that either plan is practicable from an engineering standpoint. The parties differ principally with respect to the prospective costs, the details of which, in view of the disposition to be made of the case, need not be considered.

Treating the Commission's order as an approval and effective adoption of the entire city plan, plaintiffs in error contend that the order deprives them of their property without due process of law; that it impairs the Wabash Railway's charter, its contract with the park commissioners by which the present right of way of the railroad was located in Forest Park, and the contract under which the Rock Island is now using the tracks of the Wabash through the park, all in violation of Article I, § 10, of the Constitution. It is also urged that the order by its indirect adoption of the comprehensive city program calling for a partial abandonment and relocation of tracks is invalid as violating par. 18, § 1, of the Interstate Commerce Act, which requires a certificate of public convenience and necessity from the Interstate Commerce Commission before tracks may be abandoned or relocated.

To support the burden of proving that the order of the Commission is arbitrary and unreasonable, plaintiffs in error criticize numerous engineering features of the city's plan, especially the provision for an 18 feet clearance between tracks and viaduct, which is characterized as dangerous to life and limb.

While the federal questions thus raised, so far as they relate to the order now before us, are not difficult of solution, in view of the complexity of the facts to which the principles announced by this Court are to be applied, we cannot say that these questions are so unsubstantial as to deprive us of jurisdiction to pass upon them and to make proper disposition of the case as it is now presented. *Erie R. R. v. Public Util. Comm.*, 254 U. S. 394; *Mo. Pac. Ry. v. Omaha*, 235 U. S. 121; *Denver & R. G. R. R. v. Denver*, 250 U. S. 241; cf. *R. R. Comm. v. Southern Pac. Co.*, 264 U. S. 331. But we find it unnecessary to decide these questions be-

cause of the situation which has been created since the entry of the judgment below by the enactment of the Railroad Clearance Act, Laws of Missouri of 1925, pp. 323, 324. That statute provides that clearances over railroad tracks shall not be less than 22 feet "except in cases in which the public service commission finds that such construction is impracticable." The state Commission directed that the clearance at Delmar Boulevard crossing be 18 feet, but it made no finding that the construction of a 22 feet clearance is impracticable. There is thus presented a question of state law; the effect of this statute upon the Commission's order, the judgment of the state Supreme Court and upon action taken pursuant to them.

Ordinarily this Court on writ of error to a state court considers only federal questions and does not review questions of state law, *Murdock v. City of Memphis*, 20 Wall. 590; *Detroit & Mackinac Ry. v. Paper Co.*, 248 U. S. 30. But where questions of state law arising after the decision below are presented here, our appellate powers are not thus restricted. Either because new facts have supervened since the judgment below, *Kimball v. Kimball*, 174 U. S. 158; cf. *Watts, Watts & Co. v. Unione Austriaca*, 248 U. S. 9, 21; *Meccano, Ltd. v. John Wanamaker*, 253 U. S. 136, 141, or because of a change in the law, *Steamship Co. v. Joliffe*, 2 Wall. 450; *Gulf, Col. & S. F. Ry. v. Dennis*, 224 U. S. 503, this Court, in the exercise of its appellate jurisdiction, may consider the state questions thus arising and either decide them, *Steamship Co. v. Joliffe*, *supra*, or remand the cause for appropriate action by the state courts. *Gulf, Col. & S. F. Ry. v. Dennis*, *supra*; *Dorchy v. Kansas*, 264 U. S. 286. The meaning and effect of the state statute now in question are primarily for the determination of the state court. While this Court may decide these questions, it is not obliged to do so, and in view of its nature, we deem it appropriate to refer the determination to the state court. *Dorchy v. Kansas*, *supra*, 290, 291. In order that the state court may be free to consider the question and make proper disposition of it, the judgment below should be set aside, since a dismissal of this appeal might leave the judgment to be enforced as rendered. *Gulf, Col. & S. F. Ry. v. Dennis*, *supra*, 509. The judgment is accordingly reversed and the cause remanded for further proceedings.

Reversed.